Manpower Losses From

Accidents

Involving Mechanical

Equipment on Army

Engineer Construction







Harold Gibson (left) says "good-bye" for the duration to A. P. Miller, Ass't, Gen. Supt.

Good Hunting, Harold!

Harold Gibson is going hunting—hunting down the tyrants who seek to destroy our freedom. He is Inland's 3000th man to join the Armed Forces, and they continue to leave at the rate of 200 per month.

Several years ago, Harold started to work as a laborer in the Inland mills. Unhampered by tradition, or class restrictions—living the

Four Freedoms—he advanced to crane operator at the No. 2 Open Hearth yard. That is the American way—under which free men choose time, place and type of work, and win advancement through ambition and ability.

Even with more than 25% employee replacements since the war began, our average steel production has been maintained at more than 100% of capacity. So, we Inland steelmakers, 14,000 strong, say, "Good

hunting, Harold," and back him and the others with Bonds, sweat and steel.



INLAND STEEL COMPANY

CHICAGO

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Atlant & Co. Dalla \$1,000 of Ne Cor apart ings York.

Air by Co roads Inc.. Calif., Ernes Facili Calif., sation Traffic Pacific

Amos \$100,00 222 to Tonnes Constructor Arcole W. L. Co., of ing &

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McGraw-Hill Publishing Co., Inc., 330 West 42nd St., New York (18)

Construction Methods

A Pictorial Survey of Current Practice, Equipment and Materials

JOHN ABBINK, Publisher

ROBERT K. TOMLIN. Editor

A E PAXTON Manager

Editorial Staff: Vincent B. Smith, Paul Wooten (Washington) N. A. Bowers (San Francisco) Nelle Fitzgerald

Patricia McGerr

BUILDINGS R

Public-Low bidder on \$5,000,000 Army contract in Norfolk, Va., is Doyle & Russell, of Richmond. Georgia housing contract was awarded to E. T. Newton, of Hattiesburg, Miss., for \$2,869,999. Norris Construction Co., of Chicago, Ill., will build factory addition in Illinois for estimated \$1,000,000.

A. Blair, of Montgomery, Ala., submitted low bid of \$967,418 for Mississippi housing contract. Low bids on two contracts for Georgia dwelling units, one for \$926,401 and the other for \$930,491, were submitted by **R. M. Lee**, of Atlanta. Army contract for building addition in Ohio went to **Robert H. Evans** & Co., of Columbus, for \$500,000-\$1,000,000. Eckert-Fair Construction Co., of Dallas, Texas, received \$500,000-\$1,000,000 Army contract. Another \$500,000-\$1,000,000 Army contract for housing was awarded to **Daniel J. Cronin, Inc.**,

CURRENT JOBS

.... and Who's Doing Them

Commercial—Evans Construction Co., of Mobile, Ala., will build 214-unit apartment for an estimated \$1,000,000. Contract for single and duplex dwellings and apartments in Warren, Ohio, went to N. K. Winston Co., of New

HEAVY CONSTRUCTION

Aircraft plant improvements at Edmonton, Alta., will be built for \$6,500,000 by Coast Construction Co., Ltd., of Vancouver, B. C. Navy contract for rail-roads and buildings in New York area went to Elmhurst Construction Co., Inc., of New York, for \$3,834,752. Contract for runways at Camp Kearney. New York, for \$3,834,752. Contract for runways at Camp Kearney, was awarded to **Haddock Engineers, Ltd.,** of Oceanside, for \$2,267,929. Ernest Loyd. of Fort Worth, Texas, has \$1,000,000.\$5,000,000 Army contract. Facilities at amphibious training base will be built for Navy in Coronado, Calif., by Zoss Construction Co., of Hollywood, for \$1,703,304. Bryne Organication. of Dallas, Texas, received \$1,500,000 Navy contract for hangars. Traffic control signal system in California will be installed by Western Pacific R.R. Co., of San Francisco, for \$1,300,000. Morrison-Knudsen Co., Inc., of Los Angeles, Calif., has \$1,141,178 Navy contract for runways in California. Airport improvements in Fernandina, Fla., will be built for \$1,005,000 by C. G. Coffee Construction Co., of Eastman, Ga.

HIGHWAYS AND BRIDGES

Among recent highway contract awards are the following: Alabama: \$100,000-\$500,000 to Southeastern Construction Co., of Ozark. Arizona: \$313,-222 to Pacific Rock & Gravel Co., of Los Angeles, Calif.: \$100,000-\$500,000 to Tonner Construction Co., of Phoenix; and under \$1,000,000 to Basich Bros. Construction Co., of Alhambra, Calif. California: \$302,949 to Griffith Co., of os Angeles; and \$100,000-\$500,000 to Frederickson & Watson Construction
Co. and Frederickson Bros., of Oakland. Colorado: \$100,000-\$500,000 to Arcole Midwest Corp., of Chicago, Ill. Florida: \$100,000.\$500,000 to E. J. & W. L. Cobb. of Montgomery, Ala. Idaho: \$687,396 to Colonial Construction Co.. of Spokane, Wash. Illinois: \$331,393 and \$247,088 to Harrison Engineer. Co., of Spokane, Wash. Illinois: \$331,393 and \$247,088 to Harrison Engineering & Construction Co., of Kansas City, Mo. Indiana: \$275,979 to Berns Construction Co., of Indianapolis. Maryland: \$221,616 to Empire Construction Co., of Baltimore. New Mexico: \$100,000-\$500,000 to J. E. Skousen, of Hobbs. New York: \$500,000-\$1,000,000 to John Arborie, Inc., of Poughkeepsie; and \$500,000-\$1,000,000 to Arute Bros., Inc., of New Britain, Conn. Ohio: \$323,613 to O'Connell & Sweeney, Inc., of Cincinnati. Oklahoma:\$100,000.\$500,000 to Bell & Braden, of Amarillo, Texas; and \$100,000-\$500,000 to R. W. McKinney, of Nacogdoches, Texas. Oregon: \$393,903 to C. H. Wheeler, of Portland; and \$387,570 to Peter Kiewit Sons, of Omaha, Neb. Texas: \$500,000-\$1,000,000 to Seattle.

SEPTEMBER, 1943

For the benefit of readers concerned with the practical application of method or equipment the following references are to articles or illustrations in this issue that tell:

How NORMANDIE WAS RAISED from mud by salvage crews pumping How PORTABLE STEEL GRATINGS were laid to facilitate equipment mons mud How MANPOWER LOSSES were traced to accidents involving general How UNSAFE PRACTICES led to serious injuries and deaths in Army How AMERICAN CONSTRUCTION MACHINERY is used by Army Engi-How EARTH-MOVING EQUIPMENT was designed in small sizes to be carried in transport planes —p. 57
How FABRIC BALLOON was inflated to serve as form to construct con crete building without using steel or critical materials —p. 58 How **DISTILLATION TOWERS** 187 ft. tall were erected at synthetic rub -p. 60 How STANDARD ENGINEERING DESIGN for copolymer plant saved How QUICK ACTING JIG saves time of welders at shipyard —p. 65
How JUNK PIPE WAS SUNK to prevent corrosion of steel water pipe How PRECAST CONCRETE PANELS were used as exterior forms for structural concrete walls —p. 67 How TWO-WAY SPEAKING SYSTEM provided communication with entire operating area in righting S.S. Normandie —p. 67 How THREE-COMPANY COMBINE of contractors will build 80 welded How BRIDGE DEMOLITION is carried out in motion picture How METALLIZING PROCESS was used to rebuild worn shafts in place How CONCRETE PLACEMENT is proceeding at almost completed Shasta How ROOFERS' TECHNIQUE was applied in lining tanks with acid-How TESTS OF PLANT-MIXED BASE indicated cement savings on air

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JAMES H. McGRAW. Founder and Honorary Chairman

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Treasurer Secretary

JAMES H. McGRAW, JR.

Inc. 330 West 42nd Street, New York (18), N. Y.

HOWARD EHRLICH

MASON BRITTON CU

CURTIS W. McGRAW

How MAPS ARE MADE for air force navigation with aid of new photo

ONSTRUCTION METHODS, September, 1943. Volume 25. Number 9. Published Monthly, on a 20¢ a copy. Return Postage Guaranteed. Allow at least ten days for change of ad-All communications about subscriptions should be addressed to the Director of

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Director of Circulation:

Please change my address on Construction Methods

To

Signed

Aviation - A Progress Report

The Lessons of War Become the Key to a Richer Peace

T UNISIA, PANTELLERIA, SICILY—stepping stones to momentous events! But that is not all. For they spell out across the blue waters of the Mediterranean a pattern of invasion that has progressed far since last summer's first major Commando operation against the French coast.

From Dieppe, you remember, too many of the raiders never got back. But in Tunisia, and on through Sicily, the Allied might plowed inexorably forward, winning objective after objective at a surprisingly low cost in casualties. Air supremacy over the battlefield? Yes. But we have learned, too, how to save lives and shorten the war by strategic air bombardment as a prelude to invasion.

Thus the bombardment plane—rarely seen by the doughboys on the fighting fronts—is destined to save their lives by hundreds of thousands in the decisive attacks that are to come. This fact is confirmed by the cold calculations of the responsible strategists. It will give renewed courage and confidence to every member of the armed forces and of the home fronts throughout the United Nations.

For instance: thorough strategic bombardment of an objective reduces by nearly fifty per cent the surface forces required for invasion. Anticipated losses are reduced from more than fifty per cent of the original ground force to about twenty per cent. Precision bombardment—as used on railroad objectives in Rome—reduces this percentage of loss still further when it is followed by offensive action on the ground.

The inference is clear. Effective prosecution of the war will require smaller ground combat forces and much larger air forces than some of our strategists once thought.

Our most urgent need, then, is for ever-mounting fleets of aircraft. And fortunately, this is just what we are getting. The American aircraft industry now is producing as many airplanes as all the rest of the world combined. In 1938 we made 100 planes a month? Now we make three times that many in a single working day. By the end of 1943, our production rate will be about 10,000 a month.

But at this stage of the war, types of planes are more important than mere numbers. In the early months the program was heavy, and properly so, with single-engine trainers. Then, as training planes accumulated, the emphasis shifted to heavier types. Now we are turning out multi-engined bombers at a rate that is the envy of the entire world. Some months ago the President revealed that we were manufacturing 500 long-range bombers every month. The figure was conservative even then. And soon we shall be producing planes of this one type at a rate adequate to replace the normal losses of a fleet of at least 1000 American heavy bombers operating as continuously as the weather will permit.

A glimpse of the poundage production may help us still further to evaluate the miraculous achievements of the aviation industry as a whole. It was 89,000,000 in 1941 . . . 291,000,000 in 1942 . . . 911,000,000 in 1943 . . . and 1,417,000,000 in 1944—if we need it. There you have the magnificent record of the American aircraft manufacturing industry—a monument to the cooperation of industry, labor, government, and to all-out teamwork between the aviation industry and those other industries which have converted their facilities to the manufacture of airplanes.

What of our enemies and our Allies?

German production probably has flattened out at 2500 a month—with downward revision in immediate prospect. Japan may be able to produce as many as 1000 planes a month—until we get our new long-range super-bombers in sufficient numbers to whittle down that figure. Italy may be able to turn out her 500 a month—for a little longer. At best the maximum Axis monthly total is 4000.

Add to our monthly score of nearly 8000, a total of approximately 4000 for Britain, Canada and Russia, and the United Nations score comes to 12,000 monthly. There we have a three to one advantage for our side, And between our own rising production and the brilliant operations of our bomber commands we should soon boost the ratio well above that figure. Therein lies the certainty of continued and growing air superiority over all the far-flung battlefields.

The critics of American airplane quality have been silenced ever since the ratio of enemy combat losses to our own on bombardment missions surpassed four to one. In the Pacific where our heavily armed and armored planes are knocking off the desperately stripped racing craft of the Nipponese, enemy losses often run as high as eight to one or more. In the Mediterranean theater, where the Italians were abandoned by their Allies, the story is much the same. Only in the well-defended homeland of the

This is the fifteenth of a series of editorials appearing monthly in all McGraw-Hill publications, reaching more than one and one-half million readers. They are dedicated to the purpose of telling the part that each industry is playing in the war effort and of informing the public on the magnificent war-production accomplishments of America's industries.

Nazis do we sometimes drop below the average but even in those rare instances the ratio is still well in our favor and the effectiveness of our bombardment is adding constantly to our margin.

Behind the production lines the battle of research and design still rages. In many a laboratory night-shift, on many a secret test field, new and terrible surprises for the enemy are in the making. Super-bombers, destined for Tokyo, have long since passed out of the design stage and the Japanese may learn about them almost any day. New discoveries, designed to sow swift, silent devastation, are farther along than our enemies believe. No longer will fog or storm or night be permitted to fight on the side of our foes.

The men of science who are toiling to broaden the horizon of our knowledge stand today on the threshold of discoveries that have been sought for centuries. New reservoirs of power may soon exert a profound influence in many fields of technology and through them on our way of life.

Once the war is won these new discoveries will be translated into better living. No longer will countless thousands spend their lives within their own communities or countries. New efficiencies in transportation will bring world travel within the reach of many who once had to stay at home. New family vehicles will navigate the skyways as easily and safely as the highways. Already more than a dozen manufacturers of airplanes, ships, automobiles, and electrical equipment are designing, building, or flying rotary-winged aircraft such as the helicopter or autogyro to meet the needs of tomorrow's families. New and safer aircraft of the fixed-wing type are ready for production as soon as materials become available.

The quality that now makes each of our war planes worth so many of those built by our enemies will be translated into the sturdy reliability demanded by peacetime operation. The devices that seek out and find our enemies behind the veil of fog or darkness will, after the war, reduce weather hazards to the point where they will be no greater in the air than on the ground.

Science and industry will continue to do their jobsand do them well. But if the world is to be made a better place for men to live in, statesmanship must not fail to do its part.

Show H. W. haw. N.

President. McGraw-Hill Publishing Company, Inc.





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'INCOR' IS WATERTIGHT INSURANCE: Where water has to be kept in or out, just bear in mind that all it takes is good concrete—well cured. There's no substitute for thorough curing, and that is why 'Incor' 24-Hour Cement is watertight 'insurance.' 'Incor' concrete holds together, places easily—and takes fullest advantage of the short time concrete can be kept wet under every-day job conditions. Thorough curing in 24 hours, instead of 6 to 8 days, does away with the risk of somebody forgetting to keep the concrete wet—'Incor' does the remembering for you! For watertight concrete, use 'Incor'—America's FIRST high early strength Portland cement—backed by over 15 years' outstanding durability record.

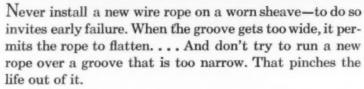
*Reg. U. S. Pat. Off.

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LONE STAR CEMENT, WITH ITS SUBSIDIARIES, IS ONE OF THE WORLD'S LARGEST CEMENT PRODUCERS, 15 MODERN MILLS, 25-MILLION BARRELS ANNUAL CAPACITY





Before installing a wire rope (even the longer-wearing, easier-handling Hozord LAY-SET Proformed) carefully check the condition of your sheaves, using the standard sheave groove gauge. For calculating safe groove diameters, the following table gives the exact extent by which the groove diameter should exceed the diameter of the rope:

For ropes of the following diameters in inches	Groove diameter should be greater than rope by not less than the following fraction of an inch	Groove diameter should be greater than rope by not more than the following fraction of an inch		
1/4 to 5/16	1/64	1/32		
3/8 to 3/4	1/32	1/16		
13/16 to 1-1/8	3 64	3 32		
1-3/16 to 1-1/2	1/16	1/8		
1-9/16 to 2-1/4	3 32	3/16		
2-5/16 and large:	1/8	1/4		

Save critical steel by careful inspection and proper maintenance of all equipment and by using Hazard LAY-SET Preformed —the greater dollar value rope. All Hazard ropes made of Improved Plow Steel are identified by the Green Strand.

HAZARD WIRE ROPE DIVISION

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Fort Worth, Los Angeles New York, Philadelphia, Pittsburgh, San Francisco, Tacoma

AMERICAN CHAIN & CABLE COMPANY, INC.
BRIDGEPORT, CONNECTICUT

HAZARD LAY-SET

WIRE ROPE

PROPER SIZE



Rear-Dump and Bottom-Dump EUCLIDS are meeting up with many old friends these days—Army and Navy men who know from their peace-time construction experience that EUCLIDS can be depended upon to get jobs done even when the going is too tough for ordinary hauling equipment.

On off-shore bases in all parts of the world, as well as here at home, EUCLIDS are hauling earth, rock and other materials for the construction of air bases and military installations that are important parts of our pattern for victory. See your nearest Euclid Distributor for facts and figures.

The EUCLID ROAD MACHINERY Co. . . . Cleveland, Ohio

For obvious reasons, photographs of EUCLIDS at work on confidential military installations cannot be shown here; these views are typical of the jobs that EUCLIDS are doing for our armed forces at home and abroad.





EUCLID

SELF - POWERED
HAULING EQUIPMENT
FOR EARTH...ROCK...COAL...ORE
CRAWLER WAGONS - ROTARY SCRAPERS - TAMPING ROLLERS





REFORE: U. S. S. West Virginia Burns and Sinks.

The construction industry, which showed America how to build cargo ships in days instead of months, has also furnished the type of rugged, portable, selfpowered and self-priming centrifugal pump which has proved so valuable for ship salvage.

Soon after the Jap rained destruction on Pearl Harbor. big 10-inch Jaeger Sure-Prime Pumps, capable of pumping 40,000,000 gallons of sea water per day and equipped with special fittings rushed from our plant at Columbus, began a 10 months' job of constant pumping that did not stop until they had helped to raise the U.S. battle fleet and its attendant vessels.

So vital was every minute that the pump engines were gassed and crankcase oil changed "on the fly" — barge cranes transferred the pumps from one ship to the next without stopping to remove the suction hose.

From the Normandie in our own Hudson river, to the famous harbor of Tobruk; and from Italian Eritrea. where a 10,000-ton drydock was refloated in 9 days, to the South Pacific where more than one urgently needed ship has been restored to service — Jaeger Sure-Prime Pumps have served our Navy and our Allies with the same fast, automatic priming, big capacity and steady. dependable performance which had long made Jaeger Pumps first choice of the construction industry.

From these, and many other war experiences (see next page), we are learning to build even better Jaeger Pumps for contractors who need better pumps for today's jobs — and for tomorrow's.

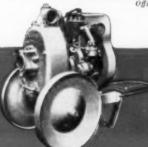
THE JAEGER MACHINE CO., 800 DUBLIN AVE., COLUMBUS 16, OHIO



Official U. S. Nacy Photo



SEMI-STEEL, IS STILL AVAILABLE THRU YOUR JAEGER DIS-2" AND 3" HEAVY





These Jaeger Pumps That Work for War Today V

obthat Jaeger Pumps are Built to Do



Official U. S. Navy Photos

BEFORE: U. S. S. California Settles in Mud of Harbor Bottom.

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AFTER: Saved and on Her Way to Drydock.

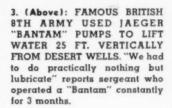
Contractors Know How to Appreciate the Pumps

That Do These War Jobs!

1. (Below): Compact Jaeger 2" Pump operates this portable filtering and purification unit for U. S. Armed Forces. Supplies safe drinking water from any pond or stream.



2. (Above): Sea water is changed into drinking water at this Pan-American Airways overseas base as well as on U.S. transports with the help of Jaeger "Sure Prime" Pumps.





BIG CAPAC-ITY 6" AMD IO" PUMPS. Electric Powored Models IV₄" to 10"



HIGH PRESSURE JETTING PUMPS, CAISSON PUMPS



Work for You Tomorrow - BUY WAR BONDS to Speed Tomorrow's Coming!





Above: A cylinder of Brixment mortar (left) and a cylinder of mortar made with 50-50 cement and lime mortar (right). Both specimens were made at the same time, and subjected to exactly the same treatment. After curing for 30 days, ¼" of water



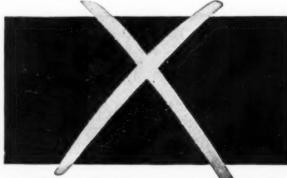
was put into the tray and the cylinders were alternately frozen and thawed 15 times. Note in photo 2 that Brixment mortar remains intact, whereas the other mortar has crumbled badly. This simple test can be made in any ice-manufacturing plant.

BRIXMENT Makes More DURABLE Mortar!

FOR permanent strength and beauty, mortar must be durable—must be able to withstand the alternate freezing and thawing to which it is subjected many times each winter.

Brixment mortar is more durable. This greater durability is due partly to the strength and soundness of Brixment mortar, and partly to the fact that Brixment is waterproofed during manufacture. This waterproofing helps prevent the mortar from becoming saturated—therefore protects it from the destructive action of freezing and thawing.

Walls built with Brixment mortar therefore retain their original strength and appearance. Even in parapet walls and chimneys, where exposure is particularly severe, Brixment mortar will almost never require re-pointing.



BRIXMENT
For Mortar and Stucco

Louisville Cement Company, Incorporated, Louisville, Kentucky. Cement Manufacturers for Over a Century.

INDEXESSION - PER SET OF

OVERSEAS BOUND

BLAW-KNOX FINISHING MACHINES

are doing a rapid and efficient job of mechanically surfacing concrete runways, taxi-ways and aprons for Allied military air bases all over the world—helping to put the finishing touch on the enemy. Teamed with the Blaw-Knox Concrete Paving Spreader as a running mate they are getting air bases built in record smashing time.

In addition to the shipment of Finishing Machines illustrated, large quantities of Blaw-Knox Airport Paving Forms, Concrete Spreaders, Bulk Cement Plants and Aggregate Batching Plants are rolling off the production lines to build the springboards to victory.

for the FINAS HING

Consult your nearest Blaw-Knox Distributor for guidance in maintaining your Blaw-Knox equipment in good working order. Most items of Blaw-Knox Construction Equipment are available for domestic users on essential projects—within limits of government regulations. You can depend on your Blaw-Knox Distributor to handle your inquiry promptly and efficiently.

BLAW-KNOX

BLAW-KNOX DIVISION OF BLAW-KNOX COMPANY 2086 Farmers Bank Bldg., Pittsburgh, Pa.

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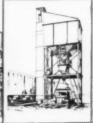
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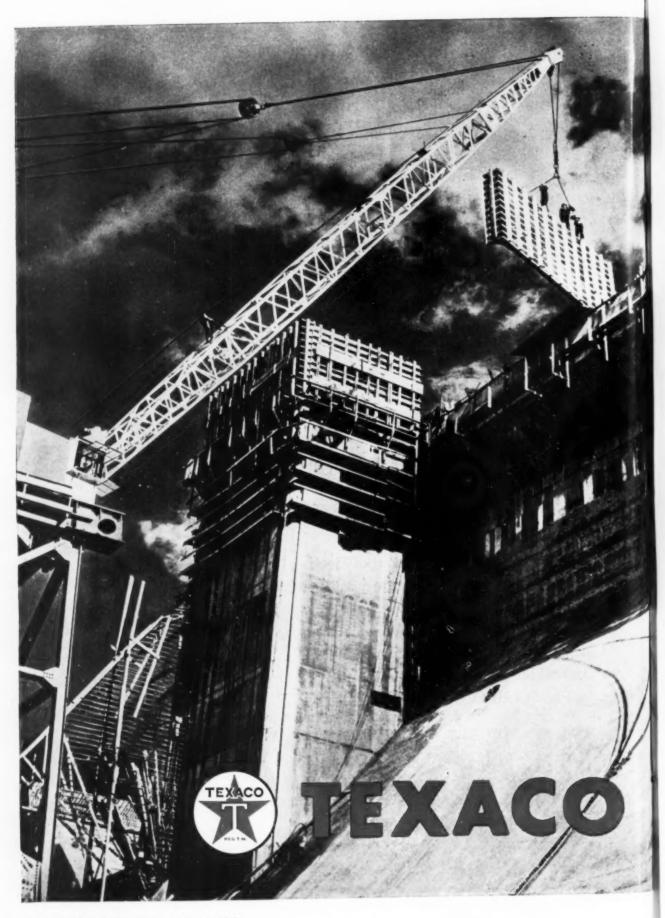
AIRPORT PAVING SPREADERS

AIRPORT PAVING FORMS TRUCK MIXER

CLAMSHELL

SHEEPSFOOT TAMPING ROLLERS CONCRETE

BULK CEMENT PLANTS



Puge 12 — Construction methods — September 1943

PROTECT your Wire Ropes

SWINGING this huge concrete form into place typifies the vital importance of protecting wire ropes against excessive wear and corrosion.

Not only in the building of giant dams, but in all work involving the use of cranes, derricks, hoists, shovels, drag lines, etc., operators everywhere are protecting their wire rope by lubricating it with *Texaco Crater*.

Texaco Crater penetrates to the very core, sealing each wire in a tough, viscous film that reduces internal friction and wear, keeps out moisture, rust and corrosion.

So effective have Texaco lubricants proved in increasing output that they are definitely preferred in the several important fields listed at the right. A Texaco Lubrication Engineer will gladly cooperate in the selection of the most suitable lubricants for your equipment. Just phone the nearest of more than 2300 Texaco distributing points in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

THEY PREFER TEXACO

- More locomotives and railroad cars in the U.S. are lubricated with Texaco than with any other brand.
- * More revenue airline miles in the U. S. are flown with Texaco than with any other brand.
- More buses, more bus lines and more busmiles are lubricated and fueled with Texaco than with any other brand.
- More stationary Diesel borsepower in the U.S. is lubricated with Texaco than with any other brand.
- * More Diesel borsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

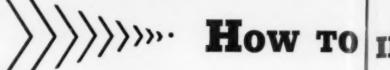
CRATER

TUNE IN THE TEXACO STAR THEATRE
EVERY SUNDAY NIGHT—CBS

HELP WIN THE WAR BY
RETURNING EMPTY DRUMS PROMPTLY

TRAINING LESSON No. 2

(For New 'Dozer Operators)





Starting A Cut Right Is Important

When starting a sidehill cut, first dig out a bench large enough for the tractor to set level. To do this, set the tractor at right angles to the line of the road with the rear end down hill. Then drop the 'dozer blade into the ground and keep pivoting the tractor right or left until you have a bench to start from. The inside of the cut should be slightly lower than the outside. It also should be on the line of the finished slope and at the highest point possible on the upper side of the right-of-way. The 'dozer can then work along the slope, cutting a shelf as it proceeds, by pivoting the tractor to the outside and side-casting the dirt. A small windrow of dirt should be maintained on the outside of the cut to keep the tractor leaning toward the inside.



What To Do When Backfilling

Backfilling sewers, pipe lines, etc., is easy with a LaPlant-Choate "Trailbuilder" using the blade angled but not tilted. Simply drive parallel alongside the trench, casting the material inside. If there is material on both sides, best method usually is to make a pass the full length of one side, returning on the other side for a pass and continuing until filling is completed. When using the blade straight for filling a trench or making a fill, always raise your blade slowly as you reach the edge of the fill or excavation. This leaves the dirt higher in the fill to allow for shrinkage and helps compact the material as the fill is built. Work across the fill as soon as possible.



"V" Ditching And Trenching

LaPlant-Choate "Trailbuilders" can be used efficiently to build "V" ditches simply by lowering one point of the blade to the last notch on the back and building up a short windrow of dirt on the other side. As the tractor moves forward, the windrow of dirt under the one track plus the tilt of the blade starts a "V" ditch that can be enlarged by repeated trips on either side. To open a slush pit or ensilage trench, the blade is best used in the straight buildozing position. This is done to push the material out of the hole which usually has vertical sides, with both ends sloping upward from the center. At the end of each pass, time can be saved by reversing the tractor and backing through the trench, instead of turning around.



Helpful Tips On Finishing

In finishing operations, the "Trailbuilder" blade should be levelled up horizontally but may either be angled to cast material right or left, or used in the straight bulldozing position for drifting it forward. To prevent uneven cutting or spreading, the shoes also should be adjusted about ½-inch above the ground line, with the cutting edge on the ground. Always make sure the tractor is level before starting a cut. After a portion of the work is levelled, let your blade overlap the finished work so one track of the tractor will travel on the finished portion. By watching this end of the blade, the cutting edge can be kept at the ground line, thus maintaining grade without cutting on the finished side.

INCREASE YARDAGE ··· REDUCE COSTS with LAPLANT-CHOATE 'DOZERS

HOW TO GET more output from present machines and untrained manpower is coming to be more of a serious problem every day. Especially in the fields of earth moving and land clearing, where considerable skill and experience are required for efficient operation of 'dozer and scraper equipment. In an effort to simplify these problems, LaPlant-Choate is using this current series of advertisements to bring you practical "job hints" gained through years of close contact with thousands of successful users throughout the world. Much of this information is not new, but in sharing the "know-how" of LaPlant-Choate engineers, it is our hope that somewhere along the line, we may give you an idea that will prove helpful — in speeding up an important job, or in training new operators. There are literally hundreds of jobs that can be done faster, easier, better with one man and a LaPlant-Choate 'dozer and it is the purpose of these messages to explain how to get the best results.

Trail-

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Average 'Dozer "Yardage Table"

Showing estimated cubic yards (bank measure) moved per hour with various size tractors on various length hauls.

Trac- tor Size		Average Haul in Feet						
	Gear	50′	100′	150′	200′	250′	300	
D-8	Standard	124	92	59	48	39	31	
D-7	Standard	110	73	52	47	39	32	
D-6	Standard	90	58	44	38	32	28	

NOTE: Based on good earth or loam on level hauls, using the following pay loads per trip: 2.3 cm. yds. for the D-8 tractor; 1.9 cm. yds. for the D-7 and 1.5 cm. yds. for the D-6. Note efficiency of the D-7 and D-6 on longer hauls, due to high speed reverse gears. Average fixed time for shifting gears at each end of run is approximately 0.3 minutes.



Following the same path on successive trips keeps more dirt ahead of the blade, thus increasing loads.

6 Ways to Increase 'Dozer Production

- Drifting dirt down hill will increase yardage (uphill will decrease it).
 Controlling factors are: grade, travel speed and kind of material.
- Quantities can also be increased from 30 to 50% when backfilling or drifting material short distances into excavations.
- When digging or drifting loose material, extra yardage sometimes can be gained by working two 'dozers side by side (if you have good operators). This gives the effect of one long blade with less spillage.
- 4. When working downhill or in a trench, try moving one blade full of material into the start of the haul. Then back up and push in another load before you start to the dump — this doubling the amount of material you move each trip.
- When moving forward with a load, keep your blade in a position to make a light cut — thus replacing the material lost around the ends and leaving a smooth surface for following trips.
- 6. On longer hauls, follow the same path on successive trips, so that dirt spilling out from the ends of the blade will form a windrow on both sides of the 'dozer. This will keep more dirt ahead of your blade and increase your loads.

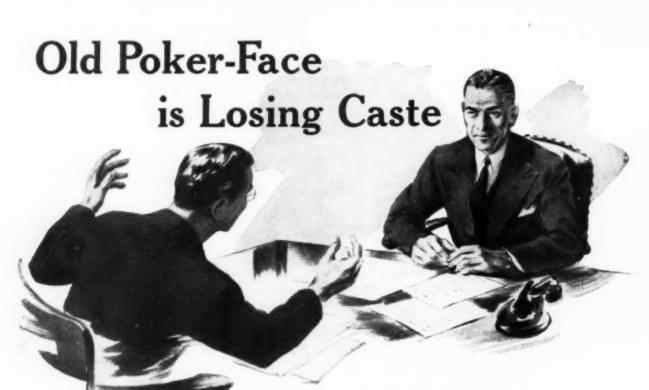
WHEN YOU NEED HELP, CALL

YOUR LaPlant-Choate"Caterpillar" DISTRIBUTOR

FOR PARTS AND EXPERIENCED SERVICE



WORLD-FAMOUS TOOLS FOR EARTH-MOVING, LAND-CLEARING AND SNOW REMOVAL. BULLDOZERS, TRAILBUILDERS, "CARRIMOR" SCRAPERS, RIPPERS, TAMPING ROLLERS, TREEDOZERS, BRUSH AND ROOT CUTTERS, BRUSH RAKES, TAMPBLADES, STUMP SPLITTERS, ETC. (HYDRAULIC OR CABLE CONTROLLED)



BUYERS who imitate the clam and play their thoughts "close to the chest" never were very popular. They are less so now. "Not interested" is a dangerous reply in these days of new ideas, new ingredients and new methods.

Wise buyers lay their cards on the table nowadays. They talk their problems and hunt new ideas to rub against their own. They are seeking men whose minds will click with theirs to produce a 2 plus 2 equals 5 result. Synergistic thinking is the name for it and it is a growing habit in the construction industry.

So many new discoveries and methods are coming out of laboratory and field experience that it takes synergistic thinking to make full use of their possibilities.

Choosing the right explosive for the job is a case in point. The old days of "Make it 40%, at so much per pound" are on the wane. Nowadays explosives men and buyers get together to find exactly the right grade and the best procedure. The story has changed to, "Get the job done right, at the lowest cost, with the greatest conservation of men and machines to speed Victory and the Peace."

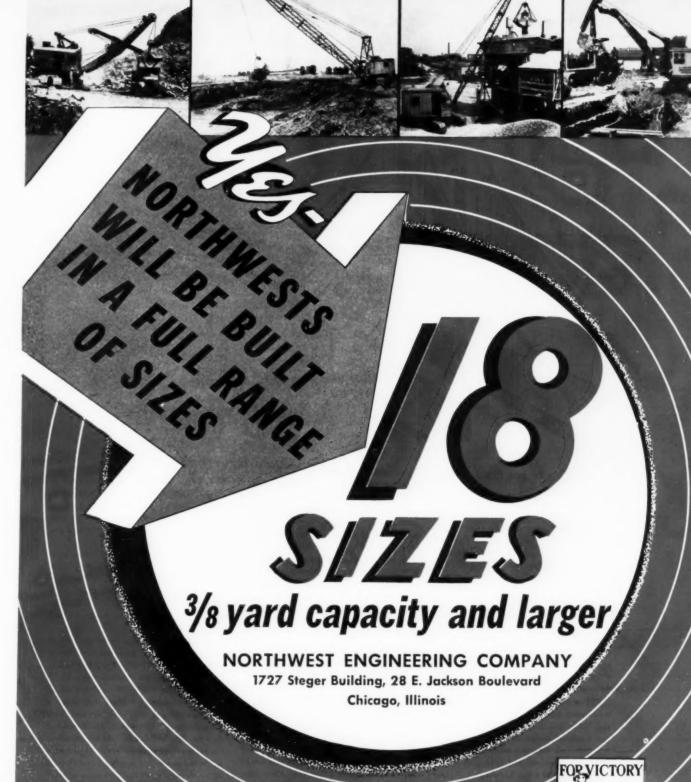
The very existence of more than one hundred grades of Atlas commercial explosives is a practical invitation to synergistic thinking with Atlas on the part of construction men who may profit by "Better Blasting" applied to their job.

We will welcome the opportunity to practice synergism with you.





ATLAS POWDER COMPANY, Wilmington 99, Del. Offices in principal cities · Cable Address-Atpowco



NORTHWEST

SHOVELS . CRANES . DRAGLINES . PULLSHOVELS



VICTORY



You're going to see the Yukon!

You breakfasted in Dawson Creek, and now your car hums along the smooth Alaskan Highway, through the wide, pine-studded country of British Columbia. Around a curve, and suddenly, before you stretches the valley of the Peace River, spanned by one of man's most beautiful works... the suspension bridge. "Here's a bridge," you'll say to the family, "that helped to win the war."

You may stop a moment beside the bridge's approach, to tell them more about it. "That's a lot of river," you may say. "Two thousand feet wide, running 8 miles an hour! And here in the wilderness, a great bridge..."

"How ever did they get it here?" your wife asks, ever practical. "Well," you say, "they trucked it here,—100 freight car loads of material and equipment—not in balmy summer weather either. It was in the winter and spring of 1943. Bitter cold, snowing, blowing..." And before it reached Dawson Creek lay the urgent, anxious period of design, details, orders, priorities, manufacture and shipment, all compressed into the unbelievably short time of 18 weeks, an achievement made possible by the most complete co-operation between Roebling and the U. S. Public Roads Admin-

istration with the timely assistance of the U. S. Engineers when special priorities were required.

"There wasn't much here when the men arrived. Roebling carpenters built weather-tight shacks for the men. Roebling men cut wood for Roebling cooks who kept their stoves heated red. Disease struck, and at one time eighty men were down. From Trenton, medicine was packed, and flown by plane..."

"Was the river frozen?" Johnny queries.

"It was frozen fifty-four inches thick. 41/2 feet of ice. So they used the ice-built their construction tower on it. Because it was the fastest way. But they gambled, for they knew the ice would thaw. The break-up would come in March. Ice unsafe after March 15 and almost certain to be dangerous by April 1. That was the report.

"They raised one bridge tower, then skidded their 100-ton construction tower across the ice to raise the other one. Just like a sled. They had to hurry. But they won.

"After the break-up, the bridge towers stood safely pointing to the sky. They needed motorboats, but there were none. They built them. The 'John A. Roebling' and the 'Washington Roebling,' named for America's bridgebuilding pioneers, helped the Army ferry as they worked to build the bridge. One operation followed another in rapid succession as Roebling, working hand in hand with P. R. A. field men maintained the tempo and rushed the bridge to completion."

"This bridge was so vital," you continue, "that as soon as the cables were spun across, they carried a gasoline pipe-line over on them. Trucks shuttled to one end of it, and from the other end toward the Alaska-based bombers and fighters,—and Tokyo..."

You swing your car onto the bridge and purr along, a hundred feet above the swift Peace River. "They finished it in record time. In August, 1943..."

"Surpassing their 100 year record as bridge builders, Roebling has done a magnificent job at Peace River," says Commissioner Thomas H. McDonald of U. S. Public Roads Administration. "Construction is complete...7½ months after the contract's signing ... 18 weeks after the setting of the first piece of steel ... cutting in half the best previous construction time!"

If you would like to read more of this Roebling saga, and own a color reproduction of the Peace River Bridge, write today. John A. Roebling's Sons Company, Trenton 2, New Jersey.

Bridge Builder... Pacemaker in Wire Products ROEBLING

To make sure you're operating your Carryall Scrapers at top efficiency...

If you're not getting the yardage from your Tractor-Scraper rigs that you think you should, use this simple LeTourneau Carryall check list. It will quickly show you where the job is falling down and what to do to correct the situation.

Ask for Earthmoving Estimator.



This handy Le Tourneau Estimator will give you yardage figures and other perti-

nent data for specific hauls and grades. Use it to supplement Check-List given here. Copy free for the asking.



Winston Bros., long-time LeTourneau fleet users, here maintain a well compacted, smooth, dustless haul road so operators can hit top speed quickly and maintain it without time-consuming gear shifts. "Caterpillar" D8 Pusher enables Model W Carryall (23 heaped yards) to load in minute or less.

(Below) List & Clark spread and get off the fill in a hurry with Model LP Carryall (15 heaped yards) and "Caterpillar" D7 Tractor.

CHECK YUOR OPERATIONS

with this handy Le Tourneau check-list*
It's Planned to Cover Your Complete Earthmoving Cycle...
Shows You What to Look for at Every Operating Step

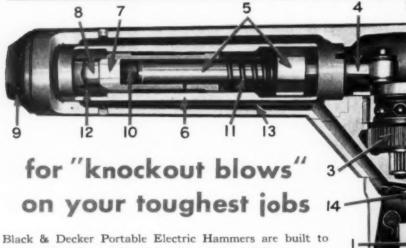
LOADING . . . Check These Points 1. Carryall Scrapers should carry heaping loads. 2. Loads should be obtained in 100 feet or less. 3. In average conditions, heaping loads should be obtained in 1 minute or less (for Carryalls over 15 heaped yards pusher or snatch generally required). 4. If more than 100 feet or 1 minute is required to load, then 5. Material may be too hard and should be broken with a Rooter, or 6. Blade may be cutting too deep, causing tractor motor to slow down, or 7. Cut may be too light, not making full use of tractor power. 8. Always establish down-hill loading. It's rarely ever impossible. HAULING . . . Check These Points 1. Tractor should average 4.0 m.p.h. travel speed in normal conditions. 2. Use highest gear utilizing full r.p.m. 3. No more than 1/4 minute is necessary for turns. 4. Use shortest travel routes. 5. Maintain smooth roadways for fast travel. SPREADING . . . Check These Points 1. Spread loads in highest possible gear. 2. Unload dirt in the shortest distance-possible, according to depth of spread. 3. Spreading should be accomplished in .5 of a minute or less. 4. Get off the fill as soon as possible. MECHANICAL . . . Check These Points 1. Check all adjustments on Carryall Scraper and Power Control Unit. 2. Carryall blade should be installed properly and be in good condition. 3. Cable must run free on sheave wheels without binding. 4. Lubricate sheave bearings every 8 hours. (See LeTourneau Lubrication Chart). 5. Check all moving parts for free movement. 6. Check tire pressures for job conditions. (See LeTourneau Tire Chart).

CHECK WITH YOUR DEALER

If your check-up shows a need for repairs or parts, call your Le-Tourneau-"Caterpillar" distributor— he's completely equipped to handle your repair job quickly, thus reduce costly down-time. Check with him NOW.

Prepared by the LeTourneau Field Engineering Dept. from field observation of several million yards of earthmoving at home and abroad. If you have special earthmoving problems, please feel free to call on this Dept.

Black & Decker Electric Hammers



Black & Decker Portable Electric Hammers are built to deliver "knockout blows" to the toughest jobs on your construction programs. For any cutting or drilling operation that requires hammer action, these husky but lightweight "machine guns of industry" put plenty of power and speed behind the job. Specially designed Universal motor permits operation wherever there is an electric line, AC or DC—or from portable generator. Four brute models, for all kinds of construction jobs—rated for holes up to \(\frac{1}{2} \)" in concrete, \$85; to \(\frac{3}{4} \)", \$115; to \(\frac{1}{8} \)", \$145; to 2", \$195.

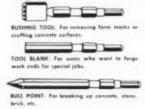
use black & Decker Hammers for faster, more efficient drilling, channeling and demolition work in brick, stone, concrete, etc. . . . for tamping and vibrating concrete forms . . . for removing form marks, and scuffing surfaces . . . for gouging, shaping and notching timber . . . for driving heavy spikes and rivets . . . for scaling and chipping operations. There are hundreds of jobs Black & Decker Hammers can do faster and better—with less effort. Write for your FREE copy of "Hammer Handbook," showing many actual operation pictures.

ALL BLACK & DECKER TOOLS can be bought on the job from your nearby Distributor... and coast-to-coast Factory Branches are always ready to provide quick, expert repair or replacement service. Consult your Distributor for complete information. The Black & Decker Mfg. Co., 759 Penna. Ave., Towson-4, Md.



COLD CHSEL: For chiroling, scaling, surfacing comusets as metal.

SPEED BIT: Cuts small hales faster than star a diamend drills.





Operating Principle of BLACK & DECKER ELECTRIC HAMMERS

Universal Motor (1) drives crank (2) through reduction gear train (3). Crank, through the connecting rod (4), drives piston (5), which operates in a metal sleeve (6) and imparts its force to ram (7) which strikes the actual blow on tool shank (8) in nose-piece (9).

Air-cushion (10) is always between piston and ram, and acts as medium through which piston stroke is transferred to the ram. On the upstroke, this air cushion becomes a vacuum which pulls the ram into position for the blow. On the down-stroke this air-cushion is compressed by piston, drives ram against tool shank. This avoids direct hammering action inside the unit—saves power, reduces wear and frictional heat.

Coil spring (11) is important. Recoil of the ram, after striking tool shank, represents unused energy. This recoil energy is absorbed by the spring and returned to the ram on down-stroke saving more power. Idler (12) keeps ram from hammering when tool shank is not in chuck. Air duct (13) surrounds mechanism; carries cooling flow of air from fan (14).



General Offices: 4494 W. National Ave., Milwaukee, Wis.

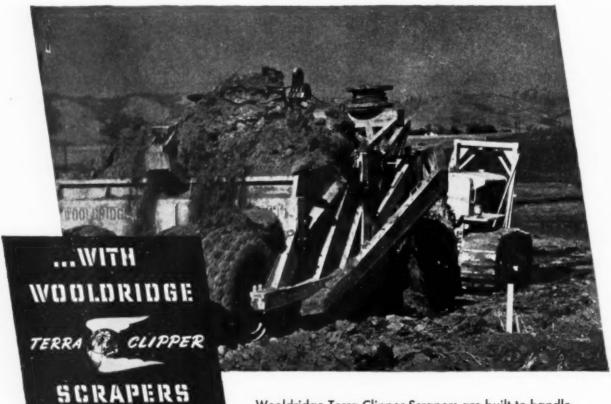
HARNISCHFEGER

CORPORATION

EKCHATORS - ELECTRO CRAMES - ARG WELDERS PSH DIGISTS - WELDING ELECTRODES - WOTONS

Dependable service is built into P&H Excavators with all-welded construction of rolled alloy steels, true rolling crawlers, hydraulic control and many other long life and low maintenance features.

MAKING MOLE HILLS OUT OF MOUNTAINS ...



ing Scrapers are built in sizes ranging from 4 to 30 cu. yard capacities. They are supplied to the United States Government for essential war jobs, for two line operation permitting two drum power units to be used. WOOLDRIDGE Scrapers operate on the pivot-tilt forced load ejection principle.

INVESTIGATE TODAY-THEN
SPECIFY WOOLDRIDGE WHEN YOU BUY

Wooldridge Terra Clipper Scrapers are built to handle mountainous volumes of earth. By consistently moving heaping yardage loads trip after trip—shift after shift, hills and mountainous slopes are leveled just as if they were mere mole hills. Faster loading and dumping, shorter turns, and less down time for repair, totals up to lower yardage costs and faster dirt moving operations. To keep costs down and speed up your jobs whether they're large or small, give careful consideration to Wooldridge Scrapers and you'll find they are designed for your exacting requirements. Start your investigations today by writing Wooldridge, stating your needs.

WOOLDRIDGE

MANUFACTURING COMPANY . SUNNYVALE, CALIFORNIA

SCRAPERS . POWER UNITS . BULLDOZERS . RIPPERS . TRAIL BUILDERS





Remember the Horse Killer?

If you're old enough to remember silent movies and crystal set radios, you'll probably recognize this gent. He was a pretty familiar sight on our city streets a generation ago. Under his heavy hand, tired, overworked horses collapsed beneath their loads, died on the job before their usefulness had hardly begun.

Today this killer rides again!

On construction jobs all over the country, good tires, sound tires, tires with thousands of miles of service still in them are literally being beaten to death with loads they were never meant to carry, on jobs they were never designed to tackle, under conditions they were never built to meet.

Do not permit this needless destruction of tires on *your* jobs.

The B. F. Goodrich Company, in an effort to help you cut your costs and save rubber for the nation, is offering to *all* fleet owners a time-proved Tire Conservation Service that for 15 years was available only to operators of large bus fleets.

Under this comprehensive, point-bypoint program, factory-trained tire specialists take over the complete supervision of your tire maintenance. They apply to your tires the experience they have gained in handling literally thousands of trucks, tractors, and trailers; eliminate the causes of most premature tire failures; and make mileage-stretching recommendations which in many cases result in immediate cash savings to you.

Many of the country's largest fleet

operators have already signed up for this low-cost program and write enthusiastically about its benefits. Said one, "We believe we will show a 25% saving." Others report tire failures reduced as much as 60%. One man wrote, "We have had only one tire failure in 149,863 vehicle miles!"

With such results it's no wonder that literally thousands of trucks are operating more successfully and economically under this plan. For this is no ordinary tire conservation idea, but a scientific program based on putting tire maintenance in the hands of *trained tire men*—the first of its kind to be offered by *any* rubber company. It is another example of B. F. Goodrich leadership in truck tires.

If you would like to know how this program can be applied to the tires on your construction equipment, write the Tire Conservation Department, The B. F. Goodrich Company, Akron, O.



Smoothing the way

for another important highway's



Laying a new TEXACO Asphalt wearing surface over worn brick on U. S. 20, near Mentor, O.

The Highway Engineer and Contractor never make the headlines. But their contribution to the success of America's war effort is vitally important nevertheless. In spite of material, equipment and manpower shortages, it is their job to keep the nation's network of main highways in the best possible condition to serve essential wartime traffic.

Typical of how highway engineers and contractors help the war effort is the project on U.S. 20, near Mentor, Ohio, pictured here. The old, uneven brick surface on part of this important highway has been eliminated. Wartime traffic now rolls smoothly over a resilient, skid-proof TEXACO Asphalt pavement, which has been laid over the old brick surface without interrupting the flow of traffic during construction.

For our part, we are exerting every possible effort under necessary war restrictions to cooperate with the highway engineer and the contractor.



A TEXACO Engineer, who specializes in Asphalt construction, is at your service.

THE TEXAS COMPANY, Asphalt Sales Dept., 135 E. 42nd St., New York City Philadelphia Richmond Boston Chicago Jacksonville Houston



TEXACO ASPHALT

ROADS FOR TOMORROW





WHEN the tools of war are laid aside and the plans of contractors, road officials and machinery builders are put into action, the surface of the American continent is due for some material changes. Farseeing road officials, recognizing the need to modernize their highway systems, are making plans now to reduce steep grades, widen curves, provide clear driving vision, widen surfaces, improve drainage and, where necessary, separate opposing lanes of traffic.

Contractors, with an eye to the future, are planning to streamline their organizations . . . modernize completely . . . so they will be able to handle a big volume of new construction. You will have to be competitive-

ly equipped to get your share of the work... and you will be... by standardizing on Allis-Chalmers equipment. New and better types of earth-moving machines will result from the experiences of the war... time-savers that will reduce your cost per yard and enable you to handle more work at more profit. Now is a good time to see your Allis-Chalmers dealer and discuss your post-war equipment needs.

To provide you with more potent "weapons" than ever before, Allis-Chalmers has modernized crawler tractor and motor grader performance...put smooth, powerful 2-cycle Diesel engines in both units...made the tractor faster, more maneuverable, with a new kind of truck roller lubrication that lasts 25 shifts instead of one...added more windrow clearance, more traction and a full range of blade positions to

the motor grader. Result — more profit per yard of dirt moved! Performance of the past is a good guideforthefuture!





ALLIS CHALMERS





Here is a crack "Express Train" of 1865 as pictured by Currier & Ives. Four years later an important new era in our transportation and economic history was celebrated with the completion of the first railroad linking the Atlantic and Pacific.



War building is being rushed ahead with reliable General Motors Diesel power. And in the days to come this dependable, rugged, economical power will be ready to do the bard jobs of peace.

Throughout history, wars have set up new milestones of transportation progress. And with this war, it is the General Motors Diesel Locomotive that is ushering in the new era. What advances the future will bring are already apparent in the present performance of these locomotives and the way they are helping to meet the abnormal demands upon the railroads today.

BACK THE ATTACK-WITH WAR BONDS



LOCOMOTIVES......ELECTRO-MOTIVE DIVISION, La Grange, III. ENGINES . . 150 to 2000 H.P. . . CLEVELAND DIESEL ENGINE DIVISION, Cleveland, Ohio ENGINES 15 to 250 H.P..... DETROIT DIESEL ENGINE DIVISION, Detroit, Mich.



CHAIN BELT COMPANY OF MILWAUKEE

Mortar and Plaster Mixers • Pavers



SEABEES USE BAKERS TO BEAT JAPS ON SOUTH PACIFIC ISLANDS

Tree Dozing, Leveling and Grading Speeded to Completion

Hogging out landing strips and airports on South Pacific islands, despite almost continuous air and land attack, was speeded to completion with Baker Bulldozers and Gradebuilders. Seabees, U.S. Engineers and other construction units used these versatile tractor units to hasten many construction jobs.

Tree dozing and jungle clearing, road building, leveling and grading landing strips and air fields-all were taken in stride and speedily finished.

Top Brace Is Safety Factor

In jungle dozing, the overhead brace on Bakers was found to be a valuable safety factor as falling palmetto and other trees could not fall on top of the tractor operator. Flexibility of blade lift made tree dozing simple as hydraulic control allowed for inching the blade up the tree trunk for increased leverage pushing after the fall was started.

Hydraulically operated blade control, full down-pressure and smooth lift simplified grading and leveling despite the inexperienced operators, adding to speed of operations and quality of construction.

Bulldozer-equipped tractors were also widely used for pulling sheepsfoot rollers and other equipment and for hauling loaded wagons and trailers.

THE BAKER MFG. CO.

568 Stanford Avenue Illinois

Springfield

Modern Tractor Egnipment AND GRADE BUILDING

There are many applications for

Clyde WHIRLEYS



GENERAL CONSTRUCTION



MATERIALS HANDLING

SHIPBUILDING

CLYDE Whirleys are RIGHT too for material handling.

They have large rail circles, light alloy booms, and a

balanced design that allows greater loads with less

counterweight. All mechanism for hoisting, swinging and

★ Here is a kind of versatility that means time and money savings in general construction uses — that reduces material handling costs at industrial plants — that is helping in making possible better than ever before shipbuilding records.

Although standard machines, each model is designed to fit the particular needs of the service.

Contractors who are faced with unusual construction problems will find that a CLYDE

problems will find that a CLYDE Whirley has the versatility and efficiency to do the best kind of iob.

traveling is specially designed.

In shipbuilding, CLYDE Whirleys easily handle huge pre-

fabricated sections because of unusual lifting capacity, long reaching booms, high traveling gantries, and a flawless system for accurate load control. CLYDE Shipyard Whirleys are doing outstanding jobs in shipyards from

coast to coast.

CLYDE Whirleys are manufactured in seven standard sizes with lifting capacities up to 146,600 pounds at 40-foot radius or 27,700 pounds at 150-foot radius.

Send for a copy

Our new booklet on CLYDE Whirleys is ready for distribution act your copy—see the many uses for this modern machine—read the construction details—check their many advantages.





CLYDE IRON

WORKS, INC.



GENERAL

recommends the continued purchase of War tinued purchase of Stamps Bonds and Stamps and the observance of maintenance preventive maintenance to keep your machinery running.

GENERAL SUPERCRANES Conserve Vital Fuel, Man-Power and Machinery

Powered by one motor and controlled by one man the SUPERCRANE moves about freely on its pneumatic tires. Movement is much faster, with reduced wear on moving parts.

OSGOOD COMPANY

Sizes: ½ to 2½ Cu. Yd. Diesel - Oil - Gas - Electric

Associated with The GENERAL EXCAVATOR CO.

HERCULE/ COMPANY

HERCULES
IRONEROLLERS
6 to 12 Tons
Diesel or Gasoline

Associated with The GENERAL EXCAVATOR CO.

GENERAL

Sizes:
3/8-1/2-5/8-3/4 Cu. Yd.
Diesel—Gas—Electric



SHOVELS
DRAGLINES - CRANES
Crawler & Wheel Mounted

THE GENERAL EXCAVATOR COMPANY, Marion, Ohio

Whiteman FINISHING MACHINES

for BETTER Concrete Slabs in 2/3 the time Despite Labor Shortages!

Whiteman machines are really the answer to labor shortages and demands for better concrete slabs in less time. Each Whiteman machine multiplies the work capacity of your concrete finishing crews — gets the job done in 2/3 the

time. Better concrete results are secured, even with "green hands."

Job-proved, the machines get uniformly higher quality concrete, indoors or out. Insist on Whiteman machines, and your concrete finishing problem is licked — finishing crews will be released for other jobs.



WRITE TODAY OR SEE YOUR NEAREST DISTRIBUTOR FOR ADDITIONAL INFORMATION ON WHITEMAN CONCRETE EQUIPMENT

Whiteman MANUFACTURING CO.

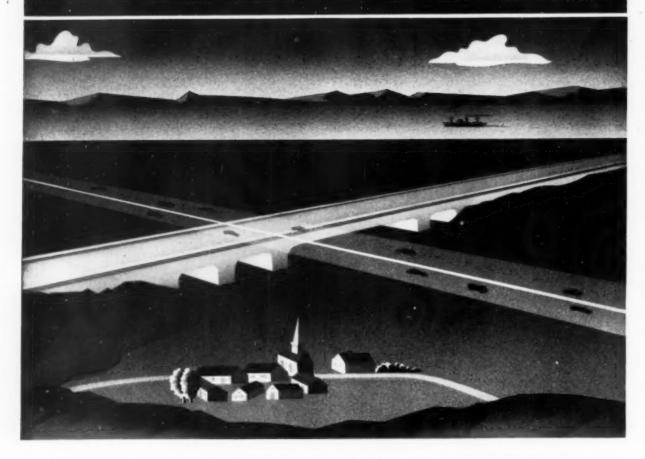
249 Casitas Avenue

firmly on the ground and locked with set screw; final grade is obtained by sliding head up or down. Entire stake is easily reclaimed. Write for

descriptive folder.

Los Angeles 26, California

How to go through an intersection...AT FULL SPEED



An overpass is needed across a busy wartime highway. It must be built quickly. Traffic must be inconvenienced as little as possible. Suppose the job were yours—the first question you ask yourself should be, "How much time (and doubtless, meney, too) can be saved by using Atlas High-Early cement?"

Whether it's an overpass, an underpass, a new airport, bridge, hospital, laboratory, or Army chapel—whatever the job these days, it's a war job. And that means it must be done in a hurry.

On all such jobs, Atlas High-Early cement saves valuable time. It produces serviceable concrete in a fraction of the time required by ordinary cement. Specify it for any or several parts of the job. Use it like ordinary cement. You can rely on it to give you durable, serviceable concrete—and do it quickly.

You can depend on Atlas High-Early cement wherever time and labor savings are essential. Check over the facts listed in the adjoining box. Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Chrysler Building, New York 17, New York.

CHECK ON ATLAS HIGH-EARLY for Wartime Construction

Atlas High-Early cement gains strength rapidly—produces serviceable concrete in one-fifth the usual time on some jobs. So it—

1. Permits serlier use of concrete, and thus gives owner earlier occupancy.

2. Saves manpower when such conservation is needed most—releases men for new jobs more quickly.

 Conserves lumber. Forms may be stripped sooner—often in 24 hours instead of from 3 to 5 days—and reused. Hence fewer sets of forms may be needed, saving time, labor and lumber.

4. Shortons time required for protection and curing as much as 70%.

3. Reduces overhead by saving time, manpower and equipment.

CM-H-57

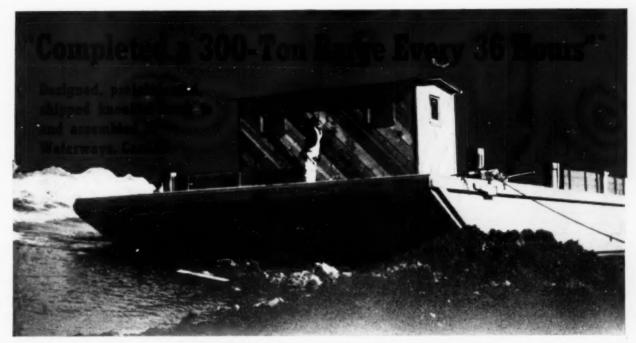
OFFICES: New York, Chicago, Albany, Boston, Philadelphia, Pittsburgh, Minneapolis, Dulath, Cleveland, St. Louis, Kansas City, Doe Moines, Birmingham, Waco.



SAVE TIME IN WARTIME WITH

Atlas High-Early Cement

A UNIVERSAL ATLAS PRODUCT



HENRY MILL METHODS



1 DESIGN ENGINEERING-SPECIALIZED, RESOURCE-FUL-A staff of design engineers, thoroughly experienced in the use of wood for all structural purposes, is available to help solve your particular structural problem.



2 MACHINE PRODUCTION — "Assembly line" production methods with specialized equipment enables the Henry Mill to prefabricate heavy timber structures faster, cheaper, and with greater precision than is possible with hand-framing methods.



3 ERECTION RESPONSIBILITY — When required, the Henry Mill will erect their prefabricated structures with trained field personnel.

*36 Barges designed and prefabricated by Henry Mill for use in Northern lakes and rivers, required only 36 hours assembly time at Waterways, Canada, with a crew of 60 men. Same crew required 14 days to hand-frame and assemble a conventional type barge. Bachtel-Price-Callohon, Generol Contractors, Conol Project.

Faster, Cheaper, Better, Heavy-Wood Construction Now Available!

HENRY MILL is an acknowledged leader in timber engineering—and in bringing modern machine methods to prefabrication of heavy timber structures. This approach makes wood the fastest, cheapest, best material for many structures heretofore considered "out of wood's field."

YOU WANT THIS BOOK—Owners, architects, engineers and contractors are invited to write Tacoma office for 90-page book, now on press. Describes Henry Mill methods and shows details of many completed projects.



September 1943 — CONSTRUCTION METHODS — Page 33

PARSONS



TRENCHERS Set Pace for Housing Projects

Parsons' speed and dependability made them first in the field when cantonments, airports and ordnance plants were constructed. And now Parsons Trenchers continue to set the pace in housing jobs throughout the country. Sewer, water, gas and electrical distribution systems must be completed first before homes can be built. Only because these machines are compactly built with alloy steels, anti-friction bearings and enclosed hardened gearing can uninterrupted, profitable operation continue. The original Parsons' patent — Offset Boom — permits excavations in narrow alleys or on road shoulders, making trenching possibilities unlimited. Speed and profit are easily available on housing projects with a Parsons Trencher.

SEE YOUR NEAREST DEALER TODAY.

Parsons Trencher cutting ditch between pavement edge and steep bank. Only an offset boom could work in these restricted quarters successfully.

THE PARSONS COMPANY · NEWTON, IOWA

TRENCHING EQUIPMENT



Pounding Out

VICTORIES ON THE CONSTRUCTION FRONT!

Thor

PAVING BREAKERS SPEED SCORES OF WARTIME JOBS

Thor's heavy artillery of powerful but easy handling paving breakers speed up demolition, rock breaking, sheeting driving, tamping, spike driving and other vital wartime jobs.

Thor breakers get their extra power from extralong piston hammers that greatly increase the foot pound blows...cylinders designed to give full effect to every hammer blow... and Thor's exclusive short-travel tubular valve that squeezes "every bit of power from every foot of air."

Thor breakers get their bandling ease from design that's compact, perfectly balanced, and stripped-for-action... from c-o-o-l, rubber-insulated grip handles... and from the quick, simple action of Thor's latch type retainer.

There are Thor breakers for light, medium and heavy duty . . . in weights from 32 to 84 pounds. For detailed information on these breakers, write for Thor Air Tool Catalog 42A.

HELPFUL FACTS

Mail coupon for catalog of Thor Air Tools.



INDEPENDENT PNEUMATIC TOOL CO. 600 W. Juckson Blvd., Chicago 6, Ill. Please send Thor Catalog 42A.

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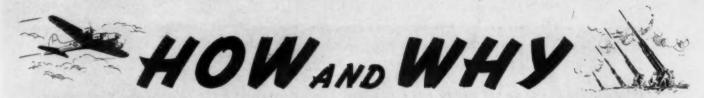
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WILLIAMS' TOOLS AID WAR PRODUCTION

DATA ON "VULCAN" CHAIN PIPE TONGS

There are 6 types of Williams' Tongs, each offering certain advantages for particular classes of work. A knowledge of the features of these various types will enable users to better select the most efficient and economical type for the work at hand.



"Vulcan Superior": A universal service tong for both pipe and fittings. Has Reversible pipe-and-fittings jaw. Seven sizes, up to 12" capacity.



"Vulcan": The original "Vulcan"
Pipe Tong—still the favorite oilfield tongs for general work. Chain
swings from center and can be used
on either side of the jaw. Eight sizes,
up to 18" capacity.



"VULCAN SUPERTONG": Same design as "VULCAN" but forged from alloy and high-tensile steel. Provides 50% greater strength than "VULCAN" with no increase in bulk or weight. Eight sizes, up to 18" capacity.



"IMPROVED VULCAN": Same as "VULCAN" except jaws are double-ended and reversible, providing double service life. Seven sizes, up to 12" capacity.



The "V" recess in
"Vulcan Superior" jaws assures quick,
positive grip on fittings.

TYPES OF "VULCAN" CHAINS

While "VULCAN SUPERIOR" and "VULCAN" Tongs are furnished with either Flat Link or Cable Chain, all other types have Flat Link Chain only.

There are three types of Flat Link Chains for Williams' Tongs—"STANDARD", "XTRA-STRONG" and "SUPERCHAIN". "Standard" Chains are regularly furnished with all except "Supertongs" but "Xtra-Strong" Chains, providing approximately 40% greater strength, can be supplied at additional cost. "VULCAN SUPERTONGS" are regularly furnished with "Superchains". Every "VULCAN" Chain, regardless of type, is individually proof-tested on a standard tension machine to two-thirds of its breaking strain.

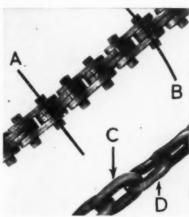
USE AND CARE OF TONGS

In using Chain Pipe Tongs the best gripping position is that which is

midway of the jaw teeth, or rearward therefrom. The bending of the tong handle under load is not evidence of a defect. Such bending is intended to act as a warning and "safety valve" in advance of breakage of chain, which would incapacitate the tool.

In Flat Link Chains on tongs, an occasional inspection of the first two or three rivets and links adjacent to the swinging, or anchor link should be made, since the load is greatest at that point. Badly bowed, or curved rivets indicate that the chain has been loaded almost to breaking strength and is probably unsafe.

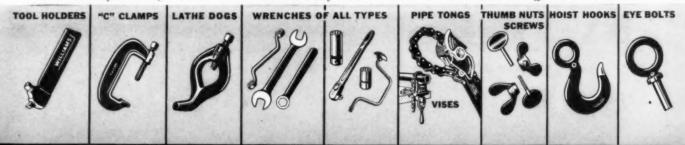
In Cable Link Chains, the links give warning by stretching and pulling "rigid" if the breaking point is approached.



- A. Straight rivet indicates chain is safe.
- C. Safe link indicated by
- B. Curved or bowed
- D. Link stretched or pulled



Sold by Leading Industrial Distributors Everywhere . . . J. H. Williams & Co., Buffalo, N. Y.





Engineered to your Specifications











TRADE MARK REG U S PAT OFF

1374 EAST 51ST STREET CLEVELAND, OHIO, U.S.A.

Page 38 — CONSTRUCTION METHODS — September 1943

29,000 hours
of crushing with one set of bearings!

A Universal Series "SL" Roller Bearing

A Universal Series "SL" Roller Bearing Crusher with 10"x24" feed opening in the New York State plant of the Loomis Talc Company crushed 204,102 tons of magnesium silicate for war needs, representing 29,000 hours of operation, on the original set of bearings supplied with the crusher.

Proof again that Universal-engineered "6 bearing" design—two on the pitman and two on each side of the frame—gives greater bearing service life, lower maintenance cost and increased output.

With any rock, gravel or rubble, you can make "little ones out of big ones" faster and cheaper with Universal Crushers. Let us send you facts!

UNIVERSAL ENGINEERING CORP.

(formerly Universal Crusher Co.) 327 8th Street West, Cedar Rapids, Ia.





9 Important Factors That Affect Wire Rope Life

Some years ago, a lad came into the country crossroads store and announced sadly that his pet dog had died."Too bad, son," consoled the storekeeper. "Did he have a dog doctor?" "No sir," answered the lad, "he just died by himself."

Your wire rope may end up that same way. It too can die by itself because of lack of care or attention. But you can help



your ropes "live" longer . . . and that is most important today ... by consulting a trained and experienced wire rope engineer. Macwhyte engineers (rope doctors) are always glad to be of assistance.

Then there is another thing you can do. By knowing what the most common "rope saboteurs" are, by taking precautions against them yourself, you can improve your wire rope service.

9 Factors Affecting Service

There are many factors affecting the life of wire rope, but the following nine are the most common.

1. Abrasion or wear 5. Crushing or mashing

2. Bending or flexing 6. Jerking or shock 7. Vibration

3. Tension or stress 4. Speed

8. Heat or friction

9. Weathering or corrosion

In reviewing these factors, we realize that some of them are normal and to be expected, but they are, nevertheless, included because all factors need to be checked and watched to see that they do not become abnormal.

The first four listed, for example, are normal when not excessive for the particular job, equipment, size and construction of rope used. The other five are abnormal and where they exist, they should be corrected if at all possible. Many working ropes are exposed to from 3 to 5 of these factors at one time.

What can the wire rope user do about them? Here are a few simple suggestions things you can watch for, simple changes you can make.

1. Abrasion or wear

All operating ropes are subjected to abrasion as a normal part of their duty, but some abrasion is due to neglect. Watch for the causes of abrasion that may be avoided, such as scraping wire rope along the ground, pulling wire rope over sharp edges and, as illustrated (left), allowing wire rope to create a sawing action on rock or other materials. Here we see a deep chan-nel cut into the rock by continuous and frequent contact of the wire rope with the rock as it operated back and forth.

2. Bending or flexing

Too small sheaves and reverse bends are the worst offenders to rope life. Here you see an example of what excessive bending can do. This rope was run over



sheaves that were too small. The results are broken wires, ruined rope

Watch for broken wires. Inspect your sheave diameters and check to make sure you have the wire rope construction best suited for flexibility and to meet other conditions of your operation. Where sheaves of necessity are smaller than that recommended, use PREformed wire rope.

3. Tension or stress

All wire rope is subjected to tension or stress, but the problem here is to see that the rope is not overstressed for its size and construction. In some cases, it has been found that a larger rope reduces the stress or pressure and prevents the rope from stretching beyond its elastic limit for which it was designed. Consequently, longer service will be obtained on some installations by increasing the size of the

To obtain the best service from wire

rope, it should not be operated beyond the recommended safe load which is a fraction of its ultimate strength and varies for different types of service, as explained in other articles in this series.

4. Speed

Generally speaking, the greater the speed of operation, the less service that can be expected from wire rope. High speed operation, such as on mine shaft hoists, high speed elevators, and cableway hoisting equipment, requires larger sheaves than recommended for other uses, in order to get the best life out of the rope. Speed is a definite factor affecting wire rope life, and is worthy of study if the best service is to be obtained.

Space does not permit a discussion of the remaining factors in this article; these will be covered later.

In these days of need for wire rope conservation, always feel free to write to Macwhyte Company, state your problems or what information you would like to have and Macwhyte engineers will be glad to give you the benefit of their advice and

This is Number 17 in a series of informative articles on how to get the most out of wire rope. It is directed to those who want to do everything they can to lengthen wire rope life and conserve steel. All articles in the series are available on request.





Mill Depots: New York · Pittsburgh · Chicago · Fort Worth · Portland · Seattle · San Francisco. Distributors throughout the U.S.A. Manufacturers of MACWHYTE PREformed and Internally Lubricated Wire Rope MONARCH WHYTE STRAND Wire Rope MACWHYTE Special Traction Elevator Rope MACWHYTE ATLAS Braided Wire Rope Slings MACWHYTE Aircraft Cables and Tie-Rods

Shovel, Crane of Dragline You who have LIMA shovels, draglines and cranes are fortunate in having machines that are built to serve their owners throughout a long, profitable life, but regardless of how good a machine is, it requires normal servicing. Today when it is difficult to get new equipment because of war work, it becomes definitely Shovel, Dragline & Crane important that you give your present equipment proper care. To assist you in this respect we have prepared a 32 page booklet, titled, "Timely Tips for the Shovel, Dragline and Crane Operator." The booklet is full of information to help the operator get better and longer service from his machine. Your copy is ready, write for it today. LIMA LOCOMOTIVE WORKS, Incorporated Shovel and Crane Division SHOVELS, DRAGLINES AND CRANES Get Your Copy NOW! LIMA LOCOMOTIVE WORKS, INCORPORATED LIMA, OHIO Gentlemen : Please send me a copy of your "Timely Tips" booklet. Buy war Bunds City SHOVELS, ¼YD. TO 3½ YD. **CRANES, 13 TONS TO 65 TONS** DRAGLINES, VARIABLE



in United States and Canada



If you want to get maximum service from your present concrete mixer equipment, just call in the Smith distributor in your neighborhood. You will find him capable and willing to assist in the solution of the many problems that are bound to pop up on practically every construction job.

Distributors handling the Smith line are selected on the basis of their integrity, service facilities and experience in the construction machinery industry. They normally stock essential parts and employ mechanics skilled in the art of repairing construction equipment. Any Smith distributor will be glad to service your equipment, promptly and efficiently.

The fact that several distributors have been handling the Smith line for more than a quarter of a century, is ample evidence of their aptitude and dependability. Smith distributors stick with Smith ... and Smith sticks with their distributors. You, too, will find it pays to stick with a reliable firm.



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MIXER MANUFACTURERS SINCE 1900



needs utmost productive power. For safe lubrication of <u>CONSTRUCTION</u> equipment in stepped-up operation use . . .



These quality motor oils, gear oils and greases protect against wear... promote continuous delivery of full designed output from heavily worked machinery.

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.



SINCLAIR LUBRICANTS-FUELS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY (INC.), 630 FIFTH AVENUE, NEW YORK 20, N. Y.

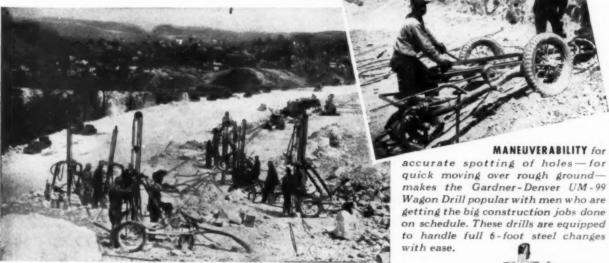
Time-Saving Methods for Today's Rush Jobs..

FOR 24 HOURS A DAY, seven days a week throughout an entire winter, these Gardner-Denver Portables delivered full output regardless of severe weather conditions, reports their owner. Compressors like these are working on the big jobs winter and summer—consistently delivering high air output without pampering.

AT HIGH ALTITUDES OR LOW, Gardner-Denver Water-Cooled Portable Compressors, like those above, are helping to speed many an important war project. Fully water-cooled cylinders assure low oil consumption—cooler discharge temperatures into air line. Both gasoline and Diesel driven models are built in a full capacity range.

FOR FAST ROCK DRILLING on an important project, this contractor selected Gardner-Denver UM-99 Wagon Drills. Like many another cost-minded contractor, he found that the extra speed and power of UM-99 Wagon Drills enabled him to drill the deep holes faster—even in the toughest formation.





For full information on Gardner-Denver Water-Cooled Portable Air Compressors, or UM-99 Wagon Drills, write Gardner-Denver Company, Quincy, Illinois. GARDNER DENVER





WHEN Jack climbed up the beanstalk, he had no modern equipment to help him. Today it's a different story, and when progressive contractors like Vogt & Conant, Cleveland, Ohio, were called upon to erect 150' high line cable towers across the Niagara River, they used a mechanized Lorain Moto-Crane to do the job. Here's how they did it.

After building a one-half mile road into the middle of the river, the Moto-Crane (traveling on its 10 rubber-tired wheels) carried $11\frac{1}{2}$ ton wood cribs (suspended on the boom) to the end of the road where they were sunk into the

river to form a small island. Then starting with a 60-foot boom and a 15-foot jib extension, and by gradually lengthening the boom to 95', then to 145', they erected the steel tower to the desired 150-foot heighth. Some of the operations at this point called for working at a 68-foot radius and also for traveling around all 4 sides of the tower. This was accomplished even when the 145-foot boom was in place.

It's performance like this that makes the mechanized, fully mobile Moto-Crane the favorite of contractors on the toughest jobs. Post-war construction will require the use of more cost-cutting, time-saving equipment like the modern Moto-Crane. Why not see your Lorain distributor for complete information soon. The Thew Shovel Company, Lorain, Ohio.

cranes · SHOVELS · DRAGLINES · MOTO-CRANES

WHAT IS MACHINERY'S No.1 ESSENTIAL?

that will keep production machines in good operating condition and continuously on the job. Idle machines due to worn bearings, gears or chains, caused by improper lubrications are certainly on the blacklist these days . . . and remember that machine replacement parts are most difficult to get. Yes—the No. I essential today is proper lubrication.

7 QUICK FACTS ABOUT LUBRIPLATE LUBRICANTS

- 1. LUBRIPLATE produces an ultra-smooth, wear-resisting bearing surface.
- 2. LUBRIPLATE reduces friction, thus lowering maintenance and power costs.
- 3. LUBRIPLATE resists rust, corrosion and pitting.
- 4. Most LUBRIPLATE products are white. LUBRIPLATE assures clean lubrication.
- 5. LUBRIPLATE outlasts ordinary lubricants many times.
- 6. LUBRIPLATE is economical a little goes a long way.
- 7. LUBRIPLATE is available in fluid and grease types for every need.

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FISKE BROTHERS REFINING COMPANY
SINCE 1870

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DEALERS FROM COAST TO COAST



LUBRIPLATE

THE MODERN LUBRICANT that Arrests Progressive wear

"Its the Film"



Instantaneous Dumping... High Speed Loading...

PROVIDE ESSENTIAL WAR SPEED

When war speed is essential Koehring Dumptors have the potential power to provide it. Easy operation ... plenty of dependable horse-power... and instantaneous dumping are a few of the features required in high speed hauling. Instantaneous gravity dump saves time as well as repair costs. Wide body top opening saves time when loading. War construction demands speed and Koehring Dumptors are constant performers where speed is essential.

KOEHRING COMPANY

Milwaukee, Wisconsin



Depend on your Koehring distributor to help you keep your equipment operating. Care for your Koehring equipment NOW, so it will serve you tomorrow. Koehring distributors have genuine Koehring parts. Koehring parts warehouses are at your service.

HEAVY-DUTY CONSTRUCTION EQUIPMENT



No excuses for late or unfinished jobs these days. When you gotta go, you gotta go. For this is war. And no operator can afford to get anything but the top in ton-miles from that prized tire certificate.

No operator can fool around with

anything but the proved best and, for twenty years, the proved best has had the Goodyear trademark on it. Contractors say Goodyears deliver the most tons the greatest distance per dollar both before and after recapping. That's why Goodyear truck tires have been the world's first choice for more than twenty years.

The Goodyear line includes special treads for every type of operation—rock, mud, snow or dirt. So when you get your certificate, just pick out the Goodyear that fits your job and see your dealer about it today.

THE BIG THREE

(Each has Goodyear's multiple-compounded construction and low stretch Supertwist cord carcass)





MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

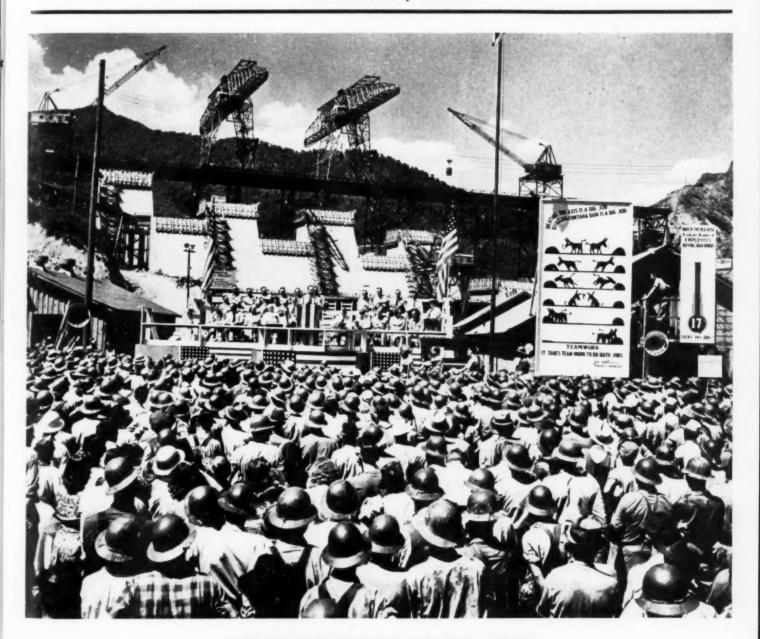
Construction Methods

ROBERT K. TOMLIN, Editor

Volume 24

SEPTEMBER, 1943

Number 9



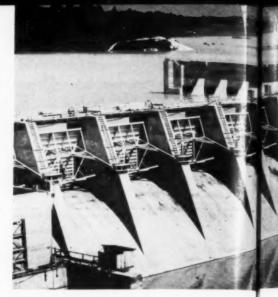
FONTANA DAM BUILDERS BUY WAR BONDS

NEARING COMPLETION on the Little Tennessee River in North Carolina, Fontana Dam is here shown as the scene of a war bond sales drive resulting in purchases amounting to 16 per cent of the gross payroll by more than 92 per cent of the Tennessee Valley Authority construction workers on this project, which is being built under the direction of Fred C. Schlemmer, project manager.

With a maximum height of 470 ft.—tallest dam east of

the Rockies—and a crest length of 1,750 ft. exclusive of side abutments, Fontana Dam will contain 2,600,000 cu. yd. of concrete placed in blocks 50 ft. wide by hammerhead and revolving gantry cranes operating on a tall steel trestle. Concrete is scheduled for placement in 14 months with work, using large-scale mass production methods going on day and night. The dam will create a reservoir with a storage capacity of 1,200,000-acre-ft.





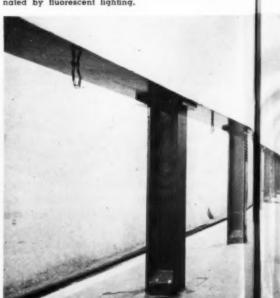
BEHIND FORT LOUDOUN DAM, closed in August.
TVA's newest reservoir begins to take shape.
When level of lake reaches crest of spillway,
water will be allowed to flow over spillway for
about two weeks while small amount of concrete is

S.S. NORMANDIE. rechristened U.S.S. Lafayette. is raised by Merritt. Chapman & Scott Corp. and Navy salvage crews from Hudson River mud in which former French luxury liner has been embedded since February 10. 1942. Actual righting operations to set ship afloat by pumping water out of hull again were begun Aug. 7 and she is here shown on next day listing at 47-deg. angle. as workmen place toot markers to record vessel's new height—39 ft.

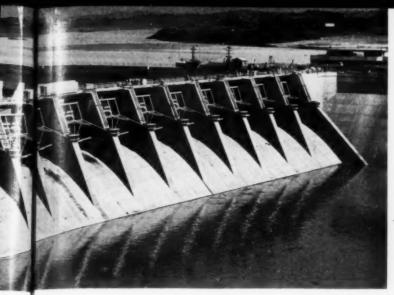
ROUND-THE-CLOCK WORK SCHEDULE speeds construction of mammeth Kentucky Dam (below) to develop power for war production. TVA structure near Paducah. Ky.. involving two-stage cofferdam of 59-ft. diameter cylindrical cells of steel sheetpiling, will impound lake 184 ml. long. At right is completed spillway section and second-stage cofferdam is shown at left. Section of foundation in left foreground is nearly cleaned and ready for concreting. Dam comprises concrete spillway section flanked by earth embankments requiring 3.000.000 cu. yd. of fill. Total length is 8,600 ft.

THIS MONTH'S NEWS REEL





CHICAGO'S FIRST SUBWAY (below) is scheduled to go into service in October. Center platform of Clybourn-Division-State St. system extends north and south under city's famous "Loop" district for distance of 3,500 ft. Train platforms are illuminated by fluorescent lighting.





placed in powerhouse section. Reservoir will extend 9-ft. channel to Knoxville. Tenn.. and produce power for war industries. With closure of Kentucky Dam near river's mouth. all-year deep-water channel length of Tennessee River will be completed.

SOLOMONS INVASION TROOPS (above, right) utilize portable steel gratings on Rendova Island to keep equipment moving over rain-soaked mud. Sectional mats, manufactured by Irving Subway

Grating Co. for emergency airplane landing fields, serve also to surface landing areas, roads, and bridges as U. S. forces advance against enemy on rainy islands,



LANDING ON SICILY after Allied assault, steady stream of transport and mechanized equipment pours off invasion armada. Heading transport column on Cape Passerno beach is one of bulldozers used to level roads from beach-head to interior. SECTION "ROAD TO TOKYO" (right, below) is under way on Attu Island in Aleutians. With island again entirely under American control, roadways are being built where none was before. Here labor battalions use bulldozers to construct operational ramp.

ACME PHOTO





NAVAJO INDIANS GO ON WARPATH in modern style as they train to build ships for victory at California Shipbuilding Corp. yards in Los Angeles. Shown with WILLIAM B. HALL, shipyard welding instructor, are, left to right, NOKI DEITSE BENELEY, ACKIE TEE, DAN PETE BEAGE, ACKIE BEIHE, and KEE BYLILLY, whom Mr. Hall brought back with him from vacation trip to Navajo Reservation as his contribution to campaign to increase number of shipyard workers.

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MANPOWER LOSSES TRACED TO

Accidents

ON ARMY ENGINEER CONSTRUCTION

An analysis of accident experience made by the Safety and Accident Prevention Branch, Corps of Engineers, U.S. Army

THE CONSTRUCTION INDUSTRY of the nation is suffering huge losses in manpower and money as a consequence of accidents involving the use and operation of mechanical equipment. This conclusion is based on a study just completed by the Safety and Accident Prevention Branch of the Corps of Engineers, U. S. Army, covering military construction and civil works for 1942, Analysis was made

of the accident experience for all construction, river and harbor, and flood control work performed by the Government and private contractors, under direction of the Corps of Engineers.

In 1942 a total of 36,338 lost-time injuries were reported, of which 10,964 involved mechanical equipment. Of the 4,944,517 days lost from all injuries, mechanical equipment accidents were charged with 2,072,196. It is obvious that a substantial improvement in severity can be effected by a reduction in the number of equipment accidents. The analysis also indicated tremendous financial losses due to property damage and repair of equipment and in delay and loss of use of equipment taken out of service.

Significant aspects of the

Engineer Corps accident analysis are:

- (1) Only 30 percent of all injuries involved mechanical equipment, but they produced 42 percent of the lost time from all accidents and half the fatalities.
- (2) More than half of all lost time from injuries in equipment accidents involved the use of cranes, draglines, tractors, and similar general construction equipment,

i.e., 25 percent of the equipment accidents produced 52 percent of all the lost time in those injuries. (See Table I)

- (3) Motor vehicles were involved in 22 percent of the accidents and produced 34 percent of the days lost in all injuries involving equipment.
- (4) In contrast, hand tools comprised 28 percent of the equipment accidents but

resulted in only 5 percent of the days lost from those accidents.

(5) Miscellaneous equipment was involved in the remaining 25 percent of the accidents, but produced only 14 percent of the total days lost.

In view of the fact that general construction equipment was involved in only 25 percent of the total mechanical equipment accidents but produced 52 percent of all the lost time from those cases, this detailed study is confined to the accidents involving tractors, bulldozers, cranes, draglines, railroad locomotives and cars, power shovels, graders, concrete mixers, and similar equipment.

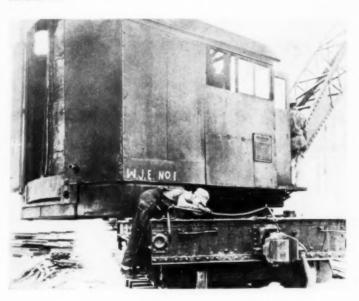
The great majority of the accidents were caused by inadequate maintenance of equipment, insufficient in-

TABLE 1 - LOST TIME FROM ACCIDENTS INVOLVING EQUIPMENT

Type of Equipment Involved in Accidents	Percentage of Lost Time	Percentage of Injuries	
General construction equipment	52	25	
Tractors and buildozers			
Cranes, derricks, etc. 11			
Railroad locomotives and cars 12			
Draglines, shovels, graders, etc. 9			
Mixers, crushers, batch plants, etc 9			
Motor vehicles, trucks, etc	34	22	
Hand tools	5	2+	
Portable power tools	3	7	
Shop machinery	2	4	
Mechanical power transmission	2	4	
Pressure vessels and boilers	1	3	
Oredges and burges	1	*	
Welding machines	*	2	
Wheelbarrows and hand trucks		5	
Less than 19%	100%	100';	



ALMOST CERTAIN DEATH awaits worker who hitches unauthorized ride on railroad car.



FAILURE TO BROOM AND CLEAN WIRES before pouring metal in socket (right) results in death, costly delay and damage to pile driving outlit (above).



REPAIR MAN RISKS being crushed if operator of locomotive crane (left) is not warned against moving machine.



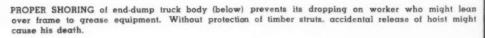
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MAN TAKES SHORT CUT (below) to cametery in trying to squeeze through narrow opening between railroad car and cab of crane.

es

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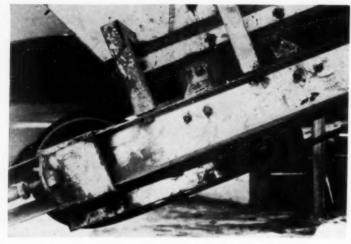
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ABSENCE OF GUARD (shown in place at right) is accident hazard. Arm of worker trying to remove rock at X was caught between belt and pulley.

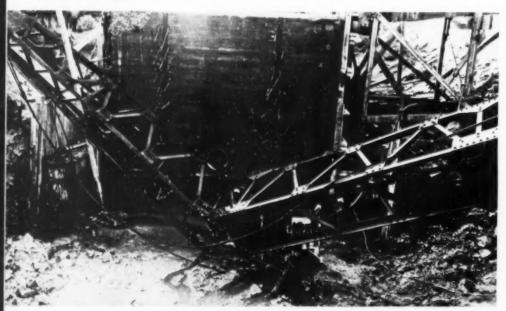


SERIOUS ACCIDENT is result of unanchored motor and attempt to "gun" machine up steep slope.



MAKESHIFT DEVICES for fueling often result in spilling gasoline on hot motor, with fatal burns for worker.





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struction in safe practices, or lack of insistence on their observance. Unsafe practices were factors in 80 percent of all injuries. The responsibility for correcting unsafe practices rests primarily with supervisors. Until accident prevention is given consideration equal to production by all supervisors, serious injuries, delays, and damage to equipment from the same causes will continue to occur.

Concentration on major accident sources and causes offers the biggest opportunity for reducing serious injuries with the available time and money. The most frequent cause of the general equipment accidents was failure to watch, warn, or signal workers likely to be endangered in backing, turning, swinging buckets, lowering mixer skips, and making similar movements. The elimination of this cause should receive most attention. Eight combinations of unsafe practices and conditions caused 75 percent of all injuries. Supervisors can, therefore, utilize the time available for accident prevention work most effectively by de-

TABLE 2 - CAUSES OF GENERAL CONSTRUCTION EQUIPMENT ACCIDENTS

Unsafe Practice or Condition ALL CAUSES	Total	Draglines, Shovels, Graders, etc.	Tractors	Bull- dissers	Concrete Mixers, etc.	Cranes, Detricks	Railroad Cars
2. Getting on or off equipment unsafely, unauthorized riding, etc.	12	7	18	23	6	5	28
3. Defective timing, brakes, elutches, cables, etc	10	10	10	3	8	13	3
4. Working or walking under skips, buckets, loads	9	12	2	6	8	14	7
Failing to retard spark, grip handle correctly, stand correctly, etc., in cranking.	59	10	19	3	3	3	
Oiling, adjusting, repairing, etc., without stopping machines	8	8	2	3	20	10	
Unguarded and inadequately guarded fans, gears, etc.	5	5	3	2	12	7	
8. Insecure grip, too heavy load, lifting with back, etc., in handling by hand	5	3	9	6	4	3	6
No personal protective equipment, particularly safety shoes and goggles.	4	8	1	3	5	2	1
). Failure to block equipment, or heavy parts in repairing	3	4	3	3	1	3	4
Operating too fast, poor light, etc., over rough or soft ground	3	5	6	5			
Hooking, coupling, hitching, etc., with hands in pinch point	2	3	2	3		2	4
Operating too close to power lines and edges of fills, on steep grades, etc	2	2	3	5	1	1	
Fueling, checking water, etc., unsafely	2	1	4	2	1	1	
Failure to secure equipment, brakes, booms and movable parts, before repairing, leaving, and moving	1	1	1	2	1	1	3
Poor housekeeping on equipment, grounds, roadways	I	3	1	2	1	2	
Overloading equipment. Insecure hitching to loads, wrong use of equip., losing control, using hands instead of tools and cases not otherwise	1	3	1	2	1	2	K-00
elassified	6	6	2	5	5	14	7

voting the largest share to correcting these hazardous practices and conditions.

The eight predominant unsafe practices and conditions are:

- (1) Backing and turning machines, swinging booms, lowering buckets, etc., without looking, warning, or signaling.
- (2) Getting on or off equipment unsafely, unauthorized riding, etc.
- (3) Defective timing, brakes, clutches, cables, etc.
- (4) Working or walking under skips, buckets or loads.
- (5) Failing to retard spark, grip handle correctly, stand correctly, etc., in crank-ing
- (6) Oiling, adjusting, repairing, etc., without stopping machines.
- (7) Unguarded or inadequately guarded fans, gears, etc.
- (8) Insecure grip, too heavy load, lifting with back, etc., in handling by hand.

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g n The important facts about these and other accident factors, summarized in Table 2, are as follows:

(1) Operating equipment without warning, signaling, or making sure workers were in the clear was a factor in one out of five accidents. This unsafe practice was an outstanding factor in accidents involving every type of heavy construction equipment but was especially frequent in accidents involving the switching of railroad cars and operating concrete mixers. The average time charge per case, excluding fatalities, was 80 days. Reports indicated a general lack of responsibility and procedures for controlling movements. Devices or means for warning workers were seldom provided. Signalmen were not posted, instructions about safe procedures were not given. and existing rules were not enforced until after accidents happened.

A typical accident occurred when a tractor operator started up without warning a man who was working on the side of the machine, resulting in a crushed and mangled foot. In another case, a worker was requested by an operator to make a coupling and, as the man stepped between the machines, the operator backed up without waiting for a signal. The worker received a crushing injury. In a third type of frequent accident a worker turned his back to the crane and bent over to arrange some pipe for the next lift. The operator swung the hook toward the pile and the hook hit the man a lethal blow on the head. A gong was installed after this accident to signal all movements of the crane.

When hand signals were required, operators frequently disregarded the requirement. Such violations of instructions were not tolerated by some supervisors who discharged their operators for making a lift before the riggers gave the signal. Repairmen and oilers were often injured because the operator started the equipment before the men completed

(Continued on page 116)

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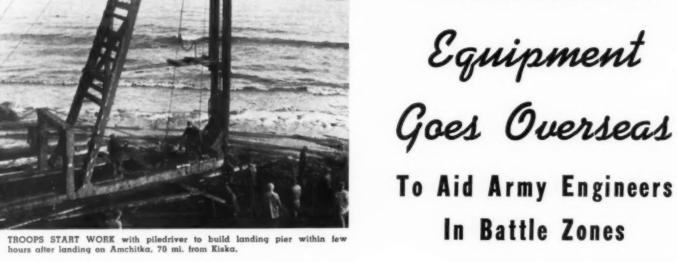
OPERATOR'S FAILURE to keep boom at least 10 ft. from electric power lines (below) results in three

POOR HOUSEKEEPING (below) reflects inefficiency and causes frequent accidents.











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DESIGNED IN SMALL SIZES (below) for plane transport, airborne equipment is ready for action in North Africa.

PUSHER TRACTOR (left) aids loading operations on carryall scraper hauled by Tournapull as North African airdrome nears completion.

ENGINEER SOLDIER with transit (right) makes survey at site of new cirfield in North Atrica.



Construction

All Photos U.S. Army Signal Corps







TRACTOR AND DRAG SCRAPER cross culvert built of native materials along new all-weather army road in New Guinea.

AMERICA'S CONSTRUCTION MA-CHINERY has gone to war. Moving over land and sea and through the air, practically all construction equipment manufactured in the last year according to the War Production Board, has been sent overseas for use by the U.S. Army Engineer Corps in aiding the forward movement of our troops. To pave the way for our fighting forces, the Engineers are building airfields, roads, bridges, docks, bases. Going with them into the battle zones is millions of dollars worth of American-made machinery, including tractors, cranes, bulldozers, shovels, graders, bituminous and concrete machinery, and jaw and roll crushers.

Cooperating with the Aviation Engineers, manufacturers of earth-moving equipment are turning out machines of sizes designed to be carried in transport planes. Tractors no larger than jeeps, scrapers the size of an average office desk, asphalt repair kits more compact than a field stove are built to the exact size of a door in a C-47 transport plane or to fit in the nose of a transport glider. Flown wherever they are needed in a

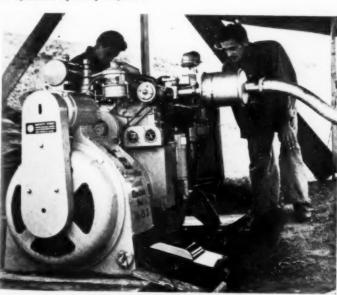


TEN-WHEEL TRUCK, landed on shore from ship, crosses North African beach on emergency roadway of steel wire and framework.



BULLDOZERS clear sand from bay inlet bottom to fill soft spots at Alaskan airfield being built by Army Engineers.

POWER IS SUPPLIED by diesel-electric set (below) somewhere in New Caledonia. Such sets are among U.S.-made equipment taken to war theaters for operation by Army Engineers.



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ENGINEERS CONSTRUCT ROAD in New Guinea (below). Man in foreground uses rock drill served by truck-mounted air compressor. At rear, explosive charges are loaded into drilled holes for blasting.





MEDIUM-SIZE BULLDOZER is used by Army Engineers to fill in crater left by 500-lb. bomb dropped in North Africa. Plane at right, bomb target, received no damage. At left, air compressor is mounted on heavy truck with winch on rear end.

hurry, these small-size machines are an important contribution to the swift construction of advanced airdromes.

H. G. Batcheller, WPB Operations Vice-Chairman, has pointed out that all types of construction machinery are going into the fight, frequently in advance or in support of the foot soldier.

"Bulldozers, for instance," he continued, "are used extensively to grade rough paths for heavy guns, and indeed have on occasion actually operated as prime movers to haul guns into position. When airfield runways are bombed, our Engineers must have—on the spot and when they need them-track-laying tractors, cranes, shovels, graders, bituminous and concrete machinery, and jaw and roll crushers. When artillery-shattered streets have to be cleared to permit passage of vehicles, temporary bridges or new roads built, emergency dockage and unloading facilities set up-construction machinery goes to work.

A year ago, it was realized that huge quantities of construction equipment would be needed overseas for war purposes. At the same time, large quantities would still be needed at home for essential activities. The War Production Board, therefore, acted to screen all home front requests for new construction machinery and at the same time instituted a 38-state pooling arrangement for the loan and purchase of used machinery of this type. The result has been that \$75,-000,000 worth of equipment more than would otherwise have been available is doing a job on many war fronts.



PLANKING IS LAID over framework of palm tree logs, as Engineers rush to completion in three days, heavy traffic bridge across river in Guadalcanal.

NEW AIRFIELD RUNWAY (below) in New Cuinea is built with aid of sheepsloot roller and maintenance grader delivered by transport plane.





ENGINEERS IN NORTH AFRICA lay roadbed of steel wire and framework over strips of burlap to carry heavy equipment over beach sands.

CONCRETE MIXER (below) is operated by Engineers for construction of base



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WALKING NONCHALANTLY on arm of gantry rane 72 ft. in air (right) is W. D. EDDINGTON of ingalls Shipbuilding Corp., Pascagoula, Miss. His ob is to inspect all cables on 18 stiff-leg derricks and gantry cranes in yard, inspecting approximately 55,000 ft. of cable each week.

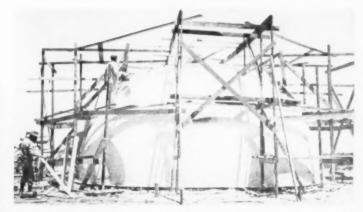
COLLECTED FOR SALVAGE (below) are these short stub ends of welding rods at yards of California Shipbuilding Corp. on Pacific Coast where 50,000 lb. of welding rod is used daily in prefabrication of steel ships of EC-2 class. To minimize waste, men are required to turn in stub ends of used rod for weighing, as check against weighed quantity of rod issued at start of shift. Stubs shorter than 2 in. are considered as "used rods."











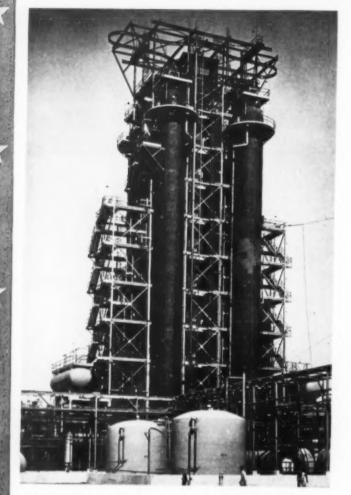
USING NO STEEL OR CRITICAL MATERIALS, new building process called "pneumatic form construction" is used at Polaris Flight Academy, at Lancaster, Calif. With foundation in place, balloon form of cotton fabric or Sisal-kraft paper is inflated by compressed air in 8 min. and mixture of cement, gypsum, and waterproofing is sprayed pneumatically over balloon. Coating sets in few hours, balloon is removed, and finishing touches are added to dome-like operations building.

SEA-GOING TRUCK known as "Duck." carries GENERAL SIR BERNARD L. MONTGOMERY. leader of British 8th Army, on tour of captured Sicilian cities. Valuable in amphibious operations such as establishing beach-heads and bridge heads, transporting troops over land and water, and carrying supplies from off-shore ships to inland supply depots, Duck here makes first appearance in European theater of war.

NINETEEN GIRLS (right) form first gang of female painters at Richmond Shipyard No. 3 of Permanente Metals Corp. Directing their operations is Painter Leaderman CHARLES EMERSON. FORE IN AFT PHOTO

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STEEL FRAME 198 ft. high surrounds 20 distillation columns of double distillation unit. Nearest columns are 11 ft. in diameter and 187 ft. tall.

ERECTION OF 187-9t. Towers AT STYRENE PLANT

By Vincent B. Smith
Associate Editor, Construction Methods

● This is the second of a series of articles, approved for publication by the War Department and the Office of the Rubber Director, telling how four typical plants were rushed to completion as part of the Government's program for producing synthetic rubber at a rate of more than 750,000 long tons per year before the end of 1943.



TWO MEN in charge of construction on styrene plant are R. I. HAYES (left), project manager, Monsanto Chemical Co., and R. W. SMITH. construction manager. Esslinger-Misch Co.

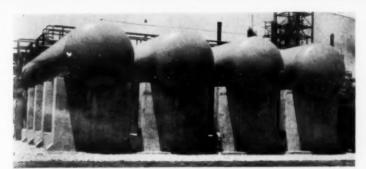
STYRENE REPRESENTS 25 percent of the feed stock which goes into the making of buna-S. To supply the demands of copolymer plants scattered about the country, the Defense Plant Corp. has completed or is completing a number of strategically located styrene plants which can efficiently ship their product by rail to the nearest copolymer units. styrene plants are designed and constructed with the advice and assistance of the industrial companies which operate the completed plants as agents for the Rubber Reserve Co. Planning and construction are coordinated and directed by the Office of the Rubber Director.

Typical of styrene plants financed and constructed under the supervision of DPC is a unit at Texas City, Tex., on the Gulf Coast, built by the Monsanto Chemical Co., St. Louis, and now being enlarged with the Esslinger-Misch Co., Detroit, as the prime subcontractor for construction. The Monsanto Chemical Co. functions during design and construction as architect-engineer-contractor for DPC, and

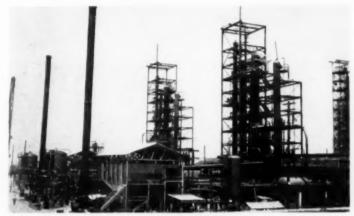
upon completion operates the plant as agent for the Rubber Reserve Co. The first completed portion of this plant began shipping styrene March 10, 1943, and additional facilities to increase plant capacity to 50,000 tons per year will be in operation this fall. Distillation and dehydrogenation units of the first completed portion were designed, procured and installed by The Lummus Co., New York City, as subcontractor under the direction of the chemical company.

Outstanding among the structures involved in the Texas styrene plant are distillation towers which include vertical vessels, or columns, 11 ft. in diameter and 187 ft. tall. The columns are set in steel frames which rise 198 ft. above the ground

Erecting Tall Towers—Each distillation tower unit comprises two large columns of the kind just described and eight smaller columns. The smaller vessels are prefabricated in complete units and are erected intact. Because of their great size and weight, the 187-ft, columns are

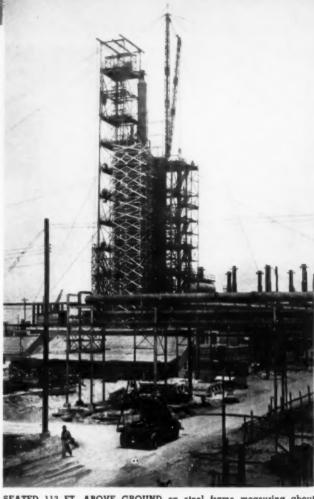


STEEL WALLS 1 1/3 in. thick in these welded mild-steel tanks retain highly volatile propane in liquid form in which it is unloaded under pressure from tank cars. Like most of pressure vessels on styrene project, these tanks came to job completely prefabricated.



PROPANE CRACKING DEPARTMENT includes two gas-burning high-temperature heaters, under roofs, and adjacent cracking towers. Quench tanks at left are protected by tile covering.



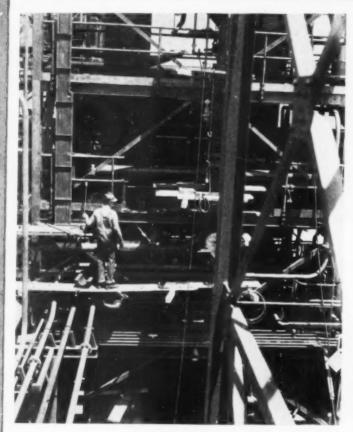


SEATED 113 FT. ABOVE GROUND on steel frame measuring about 25x50 ft. in plan, guy derrick with 90-ft. mast and 75-ft boom erects structure to total height of 198 ft. and sets distillation towers for this unit inside erected framework. Smaller towers are set in one piece, intermediate sizes in two sections, and 11-ft. diameter units 187 ft. tall in four sections. Heaviest load handled by derrick is about 40 tons.

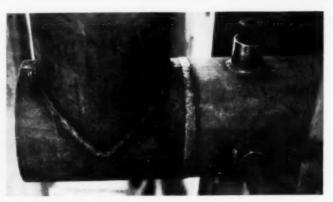
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MULTIPLE BANDS of piping, condults and tubing are supported by welded steel frame of overhead bridge leading to dehydrogenation building in background. Straight runs of copper tubing in foreground are installed in parallel alignment by pulling tubes with come-alongs.

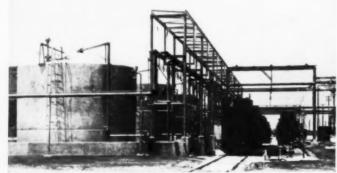




WORKMEN install insulation on high-temperature piping of tower in propane cracking department. Distillation towers in structure are insulated with cork held on by metal straps. At left is run of copper tubing furnishing air lines for instruments. Air, supplied by compressor in another building, is maintained at constant pressure by regulators.



EXPERT WELDING JOB on 15-in, stainless steel pipe indicates type of workmanship obtained on prelabricated piping.



STYRENE IS STORED in these insulated tanks alongside loading dock for filling railroad tank cars. Styrene is a water white liquid with a pleasing, pungent odor. To prevent polymerization, styrene is kept cool in storage tanks insulated with rock wool covered by asbestos cement and chicken wire, finished by coating with aluminum paint.

erected in four sections, with field-welded girth joints. Steel framing surrounding the columns is erected before the vessels are placed. A guy derrick with a 100-ft. mast and a 90-ft. boom erects the steel frame, "jumping" from level to level until it reaches an elevation 113 ft. above the ground. With the base of the derrick set at this level, the rig lifts and places the columns inside the steel framework. For greater safety in handling loads up to 35 or 40 tons, plus a strongback, at this elevation, the mast and boom are shortened to 90 and 75 ft., respectively. A photograph shows the derrick rigged on top of the steel frame at 113-ft.

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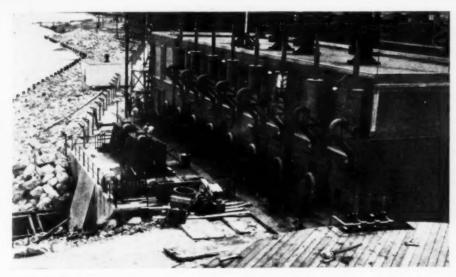
elevation. Both the steel frame, which has plan dimensions of only about 25x50 ft., and the derrick itself are strongly guyed to concrete deadmen buried in the ground.

Accompanying photographs show the magnitude and methods of construction. To prepare the site for the plant, land was built up on a 131/2-acre site alongside Galveston Bay by placing about 90,000 cu.yd. of hydraulic fill. A red clay berm first was made of dredged material, and fine sand fill was pumped in behind the berm, which served as a dike to permit settlement of the solids. Quantities involved in the present construction contract include about 15,000 cu.yd.

of concrete and some 5,500 tons of steel for process equipment and structures. The entire plant, including the portion now in operation, required 13,250 tons of steel and iron, 260 tons of alloy steel, 290 tons of copper and alloys, and 16 tons of nickel alloys. The concrete has been obtained both from a small mixing plant on the job and from an outside commercial plant which delivered to the site in truckmixers.

Substrata below the hydraulic fill lack

DEHYDROGENATION BUILDING (left) is steelframe structure containing units which crack ethyl-benzene to produce styrene. From this department, product goes back to distillation section for final distilling before being stored for shipment. In right background appear stacks of superheaters of new ethylbenzene cracking department.



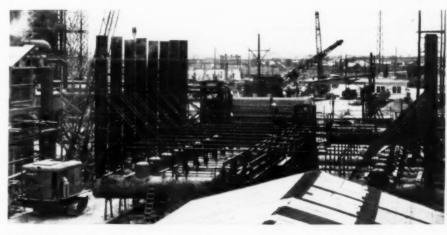
PUMP HOUSE with outside settings for eight vertical-shaft impeller-type pumps driven by gas engines picks up salt water admitted to tunnel through intake screen from flume connecting with bay at left. Chlorinated sea water is used for cooling purposes throughout plant.



HOIST LINE OF DERRICK places 8-in. valve on exhaust line in boiler area. In background, note welded tubular bracing of stacks on oilfield boilers.

bearing value sufficient to carry the heavy plant loads, and all structures rest on Raymond cast-in-place concrete piles about 54 ft. long, designed for 25-ton loading. Groups of piles under large units like the distillation towers are capped by heavy reinforced-concrete mats. These mats accounted for the largest yardages of concrete placed continuously in monolithic units on the project. The mat units ran up to 1,000 cu.yd. in volume, placed in one operation.

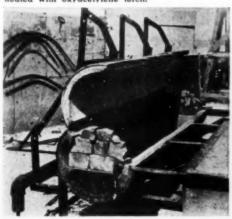
Plant processing to produce styrene starts with two liquid materials shipped in by rail. One of the materials is propane, which is shipped in and unloaded under pressure to maintain it in liquid form, as it is highly volatile at ordinary pressures and temperatures. Welded tanks for storage of the incoming propane are of mild steel with walls 1 1/3 in thick. The buna-S program is making good use of propane, a petroleum byprod-



FOR SPEEDY CREATION of steam generating plant, constructors install battery of 16 oilfield boilers, 125 to 150 hp. each, arranged in two banks of eight connected to a common header.

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GAS-FIRED FURNACE (below) lined with fire clay and fitted with hand levers for lifting top is used to preheat pipe for bending. For individual bends, when furnace is not operating, pipe sometimes is heated with oxyacetylene torch.



BENDING TABLE (below), with power winch and pipe heating furnace, makes pipe bends which cannot be prefabricated before pipe is delivered to job.



uct which formerly was largely wasted by burning in the oil fields.

Benzol, the second raw material received by rail at the styrene plant, is stored in cylindrical steel plate tanks of the ordinary type. Accompanying photographs indicate equipment installed in various departments of the plant to process the feed stocks and produce styrene.

To speed the completion of the enlarged plant, few modifications were made in the original design to eliminate critical materials. Supporting structures for vessels and process lines are almost entirely of structural steel. Reinforcedconcrete and brick construction were used for a pump house, administration building and general service building containing locker rooms, showers, hospital, offices and other facilities.

Sea water from the bay is used for cooling. The water enters the intake flume from a channel dredged to a depth of 20 or 25 ft. for about 1,000 ft. into the bay. Treatment by chlorination after the water enters the main distribution pipes reduces marine growth. A photograph shows the pump house, which provides settings for eight Pomona bowl-and-impeller pumps, of 35,000-gpm. total capacity, driven by universal right-angle

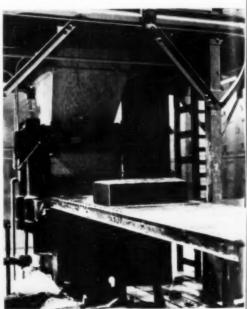
gear drives from Clark gas engines. The pumps deliver to lines of various pipe sizes for the low- and high-pressure salt water systems.

Initial steam requirements of the first completed portion of the styrene plant were supplied by an existing boiler plant acquired with the property and reconditioned for this service. To obtain quick installation of a boiler plant which would take care of additional steam demands of the enlarged facilities, the constructors procured and set in position for permanent use a battery of 16 oil-field boilers, rated 125 and 150 hp., arranged in two banks of eight each, hooked up to a com-

Cooperative Action Produces Steel-Saving Design for



RECOVERY STRUCTURE makes extensive use of reinforced concrete to support stripping towers and other equipment employed to recapture unreacted butadiene and styrene, which then are recycled to tank farm and used again in process. Milky latex solution is piped from recovery section to processing building for final treatment in making synthetic rubber.



BALE OF RUBBER weighing about 75 lb., formed by hydraulic rams in baler, comes out of press on to roller conveyor, ready to be picked up and packed in cardboard carton for shipment. Bale measures about 7x14x27 in.

TIMBER TRUSSES (below) framed with timber connectors support gypsum plank decking on roof of rubber processing building. Sprinkler system has been installed in this structure, where rubber latex is coagulated, dried and pressed into bales.



COPOLYMERIZATION (below) of butadiene and styrene to form rubber latex occurs in reactors housed in this building, designed solely to inclose aquipment necessary to the process. Frame is reinforced concrete, with some structural steel in upper story; roofing and siding on upper portion are corrugated asbestos-cement sheets.





mon header. Making steam with 16 oilfield boilers may be less economical than using a more efficient steam plant especially designed for the purpose, but rapid installation of the multiple-boiler unit made it possible to start operation at an early date, without delay to styrene production.

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In addition to the derrick, gin poles and ubiquitous oil-field winch-trucks employed on the job, the principal erection machines were three crawler cranes, a Link-Belt unit of 3-yd. capacity equipped with a 75-foot boom and an 18-ft. jib, a Lima 1½-yd. machine, and a Lorain 1½-yd. crane. These three flexible and

versatile erection units handled most of the structural materials and process equipment up to a height 60 or 65 ft. above the ground.

Subcontractors

Four subcontractors assisted the Esslinger-Misch Co. on construction of the enlarged plant. The Westheimer Rigging & Heavy Hauling Co., Houston, Tex., erected steel and process equipment. Erection and fitting of process pipe lines were performed by the J. F. Pritchard Co., Kansas City, Mo.; The Fisk Electric Co., Houston, did the electrical work. In-

sulation of process equipment and pipe lines was installed by the Standard Asbestos & Insulation Co., Houston. All other major trades were included in the working forces of the construction contractor.

When working two shifts at the peak of construction, the roster of mechanics and laborers totaled 2,200, of whom about 600 were on the night shift. In less than one year from start of construction, the contractors completed ready for operation the large initial installation capable of producing thousands of tons of styrene annually. The addition to this original

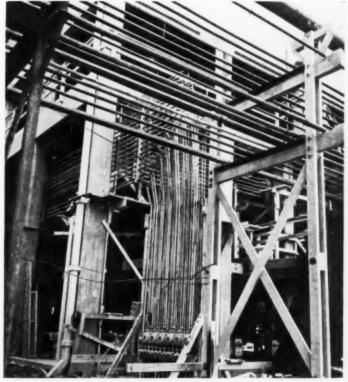
(Continued on page 138)

10 Copolymer Plant

UNIQUE COOPERATIVE EFFORT by a quartet of fiercely competitive companies, the Big Four of the rubber industry, working with a large equipment manufacturer, resulted in production of a standard engineering design for the copolymerization plants which turn out the buna-S rubber, referred to in the Government program as GR-S (Government Rubber-Styrene), for the making of tires. Virtual elimination of structural steel was accomplished in this engineering design, and use of stainless steel and other critical metals in process equipment was held to a minimum. Extremely rapid construction marked the erection in 5 months at Baton Rouge, La., of a plant with a capacity of 30,000 tons per year by the Firestone Tire & Rubber Company, acting as contractor-agent for the Defense Plant Corp, with the H. K. Ferguson Company, Cleveland, as engineer-contractor for structures, roads and utilities, and the Blaw-Knox Construction Co., Pittsburgh, as engineer-contractor for process equipment. The completed plant is being operated for the Rubber Reserve Co. by the Copolymer Corp., which is owned and controlled by seven independent rubber manufacturers listed in the introductory section last month.

Standard Plant Design — At the invitation of the Rubber Reserve Co., the four leading rubber manufacturers, Firestone, Goodrich, Goodyear and U. S., pooled their engineering talent in a cooperative effort with the engineers of the Blaw-Knox Co. at Pittsburgh for a period of 18 months. The concentrated work of this group produced a standard plant design which (Continued on page 138)

NOT EXACTLY TYPICAL (below), but interesting as an indication of condition of rubber at intermediate stage of process, is this view of stopped Logan conveyor on which workmen have thrown blankets of rubber gathered up from below, after Oliver filter has pressed out excess moisture.



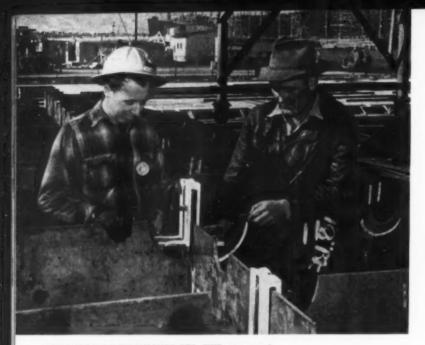
MILES OF PIPING enter into construction of copolymer plant. Vertical tubing is electrical conduit containing wiring needed for control purposes in reactor section. Horizontal overhead piping carries butadiene, styrene and other chemical agents.

Page 6

LIQUID MATERIALS for production of buna-S are received and stored in these white tanks (below), styrene under atmospheric pressure in the three lower tanks in foreground and butadiene under pressure of 40 to 50 lb. above atmospheric, depending upon temperature, in three elevated tanks in background. Framed timber bents on concrete pedestals support welded steel pipe line, with Dresser expansion couplings, which transports butadiene out of storage into process area.







They Did It

CONSTRUCTION DETAILS

Gor Superintendents and Goremen

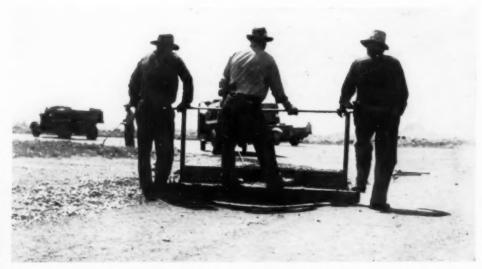
HUNDREDS OF MAN-HOURS PER SHIP are saved by quick-acting jig which clamps on to vertical keel with single set-bolt that holds two floors on edge so they can be welded to keel and inner bottom. Invented by BARNEY CLANCY, left. flanger, and LEE LUNDQUIST, welder leaderman, of Permanente Metals Corp., jig replaces average of 64 ears that had to be tacked to keel and later knocked away with extra work, patching up rough spots.

MINIMUM OF METAL is used in reinforced concrete manhole cover (right), designed by Rial T. Parrish. Dayton, Ohio, architect and engineer. Used with reinforced concrete ring (inset), cover is 24 in, in diameter and 1% in, thick, with eight stiffening ribs that increase thickness to 4 in, at center. Reinforcement consists of four concentric $\frac{3}{8}$ -in, round rods set at distances of 1, 3, 6, and $\frac{9}{12}$ in, from perimeter. Total weight of reinforcing is $\frac{8}{12}$ lb. for each cover and $\frac{10}{12}$ lb. for each ring.

TO PREVENT CORROSION of steel water pipe (below), holes are drilled for sinking junk pipe forming system of multiple anodes to feed direct electric current into ground and protect 36-in. water main. System, called cathodic corrosion eliminator, was developed by Los Angeles Department of Water and Power. Current introduced into earth flows to pipe, preventing loss of metal formerly carried away by current.







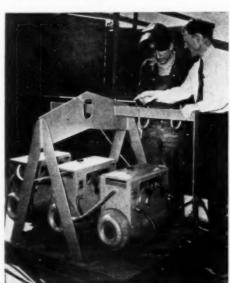
CURVED DRAINAGE GUTTER BOTTOMS of hot asphaltic plant-mix, extending along sides of runways at municipal airport at Ontario, Ore., are shaped to correct contour with this template jig devised by Julius Olson, superintendent for Morrison-Knudsen Co., contractor, of Boise, Idaho. Device is drag made of scrap steel with curved wood bottom. It is hauled along line of gutter by motor truck.

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PRECAST EXPOSED - AGGREGATE CONCRETE PANELS 2½ in. thick, reinforced with wire mesh dipped in hot coal tar pitch to prevent rusting, are used as exterior forms for structural concrete walls of wind tunnel building for testing and research work at Navy's David W. Taylor Model Basin near Washington. D. C., built under direction of Bureau of Yards and Docks. Largest panels measure 5 ft. 2 in. by 12 ft. Steel anchor straps are bent around and welded to wire mesh reinforcing for use in supporting panels as outside forms and to tie them into structural concrete. Inside forms for walls are of plywood. Precast panels are set in place by crane. Joints between slabs were filled at back to ½-in. depth with calking compound and were finally pointed and given beaded finish after structural wall concrete was placed.



FLANGER KEEPS TWO WELDERS BUSY by using Sweetland magnetic clamp to hold two stiffeners to deck plate in ship fabrication. Tack welds are made directly without use of saddles, clips, or other means requiring temporary welds. Clamp, manufactured by Glenn-Roberts Co.. of Oakland, Calif., is electro-magnetic tool designed for ship-yard use but adaptable to other purposes. Device is equipped with retractable ball-bearing wheels working on ball-bearing swivel to make movement quick and easy.



FOR QUICK DELIVERY to points of use at shipyard this "crane flat" is designed to carry three standard General Electric 200-amp. welding sets.



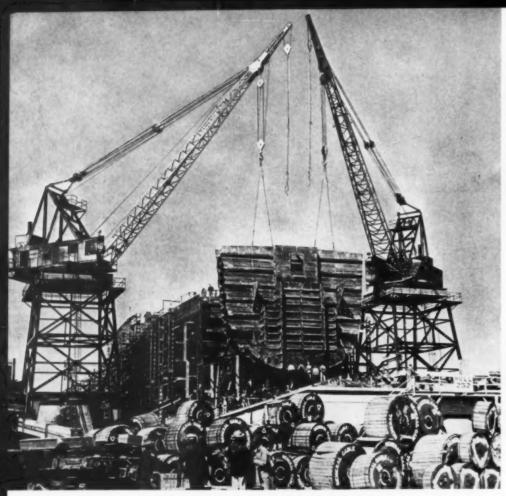
JOB OF RIGHTING S. S. NORMANDIE (right) is directed by CAPT. JOHN TOOKER, salvage master for Merritt, Chap-man & Scott Corp., with aid of Executone, highpowered two-way speak-ing system. Central control station mounted in captain's shanty on main deck is connected to 30 loudspeaker two-way trumpets scattered throughout entire operating area. Selector Selector panel with 30 push buttons enables captain to talk with any selected speaker unit above and below decks of ship and on cranes, barges and diving vessels.



PLUMB BOB HOLDER (left, below) provides easily adjustable means for varying height and attaching and detaching plumb bob. Hook, devised by M. P. Tucker, Bell Aircraft Corp., Buffalo, N. Y., is formed in one end of small strip of sheet metal, which has three holes through which fishline is threaded to hold plumb bob in any position by snubbing effect of interlaced line.

TO REACH HIGH PLACES, such as ventilators, in painting steel Liberty ships, Eclipse paint spray gun (below), is fitted with lightweight aluminum extension which eliminates need of ladders or scaffolding. Gun is fed with paint from pressure tank. Nozzle for extension can be adjusted and locked in position when used in painting hard-to-reach surfaces.







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OPERATING EXECUTIVE in charge of program of building \$0 steel tankers, is FREDERICE B. SPEN-CER, recently named vice president and general manager of Alabama Dry Dock & Shipbuilding Co.

AT GULF COAST SHIPBUILDING YARDS of Alabama Dry Dock & Shipbuilding Co., in Mobile. Turner Construction Co. and Spencer, White & Prentis, Inc., both of New York, will collaborate in constructing 80 steel tankers of new design for U. S. Maritime Commission.

Gantry cranes are lifting 75-ton preassembled cofferdam into place on ways.

PRE-ASSEMBLED WELDED UNITS (below) of steel vessel are raised to place on ways by gantry cranes at yards of Alabama Dry Dock & Shipbuilding Co., in Mobile, Ala.

Steel Tankers

To be Built by New Three-Company
Combine, Including Two Eastern
Construction Firms

ft. long, of 18,000 tons displacement, and capable of 18-knot speeds, are to be built for the U. S. Maritime Commission at a cost exceeding \$200,000,000 by the joint efforts of a new three-way combination of contractors, in which two Eastern construction firms, Turner Construction Co., and Spencer, White & Prentis, Inc., both of New York, will be associated with the Alabama Dry Dock & Shipbuilding Co., of Mobile, Ala. The work will be done at the existing yards in Mobile of the Alabama company, which is equipped with 12 shipbuilding ways and employs 22,000 men.

In direct charge of the new tanker-building program, according to a joint announcement Aug. 3 by J. Archer Turner, president of the Turner Construction Co. and Charles B. Spencer, vice president of Spencer, White & Prentis, Inc., is Frederick B. Spencer, president of Spencer & Ross, Inc., of Detroit, Mich., a subsidiary, who has been named vice president and general manager of the Alabama organization. Mr. Spencer, operating executive for the new three-contractor tanker-

(Continued on page 108)



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construction MEN who see Paramount's screen version of Ernest Hemingway's novel of wartime Spain, "For Whom The Bell Tolls," featuring Gary Cooper as Robert Jordan, an American fighting in Spain, and Ingrid Bergman as Maria, a refugee girl sheltered by a guerilla band, will find special interest in the blasting technique pictured in the climactic scene in which a strategic bridge over a deep gorge is blown up to prevent reinforcements from reaching an attacking army.

In the story, Jordan is given the dangerous mission of penetrating the enemy's lines, placing explosives charges on the bridge trusses and demolishing the structure the instant the attack begins. His task is rendered doubly difficult by the fact that Pablo, leader of the guerilla band with which he is working, has stolen and destroyed the blasting machine with which he had planned to detonate the explosives on the bridge. He overcomes this difficulty by climbing down into the framework of the bridge and lashing hand grenades alongside the

DYNAMITE (below) is passed down to Jordan who

wedges it under bridge as he straddles framework

of structure high above deep gorge.

Bridge Demolition

is Feature of
Paramount's Motion Picture
"For Whom the Bell Tolls"



BRIDGE DYNAMITER in motion picture is GARY COOPER, in role of Robert Jordan, an American fighting in Spain, here shown with INCRID BERG-MAN, who plays part of Maria.

dynamite wedged under the truss members. To the rings that release the firing pins of the grenades he attaches lengths of wire and extends them beyond the end of the bridge. When the attack begins the wires are pulled, causing the grenades to detonate the explosive charges and drop the bridge into the gorge.

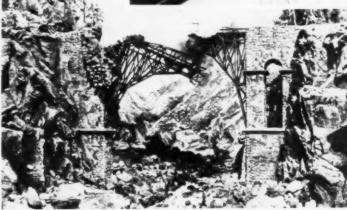
Search for locations suitable for filming the action at the bridge started with Sun Valley and Zion National Park and ended with the choice of Sonora Pass in California's High Sierra mountains. Location work covered 125 mi. of territory from the top of Sonora Pass to Tuolumne River Canyon, 35 mi. from Yosemite. Lumsden Bridge in Tuolumne Canyon served as the strategic structure around which the dynamiting action was centered. Rather than destroy a real structure, however, Paramount pro-ducer-director Sam Wood decided to conserve war-critical steel, wood and explosives by blowing up a small-scale model of the bridge, as indicated realistically in accompanying photograph.

HAND GRENADE (below) is wired to bridge truss alongside charges of explosives after Jordan discovers that his blasting machine has been stolen and destroyed.





STRATEGIC BRIDGE on which action of story centers actually is located at Tuolumne River Canyon, California. Location work covered 125 miles of territory in High Sierras.



BLOWING OF BRIDGE furnishes climactic scene in motion picture "For Whom the Bell Tolls." To conserve war-critical material small-scale model, rather than actual structure, was destroyed.

Worn Shafts Rebuilt

In Place on Concrete Mixers By Metallizing Process

By WALTER B. MEYER Field Engineer, John Nooter Boiler Works Co. St. Louis, Mo.



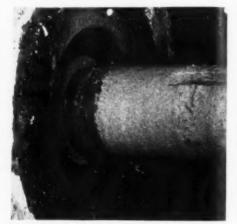
MIXING SHAFT in truck-mounted concrete mixer of open-hopper, revolving-paddle type, suffers wear on packing gland surfaces at two ends of shaft. Worn portions are rebuilt by metallizing without removing shaft from mixer.



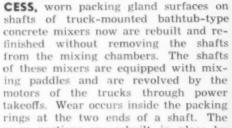
WORN PACKING GLAND SURFACE of mixer shaft indicates need for repair. In preparation for metallizing, worn portion first will be undercut with hand grinder to produce definite shoulders for deposit of sprayed metal.



TO PROVIDE BOND for adherence of sprayed metal, rough coat of special metal is fused to un-dercut portion by Fuse-Bond process.



ON ROUGH BOND COAT, sprayed metal is built up with hand gun to about 1/16 in. above finished

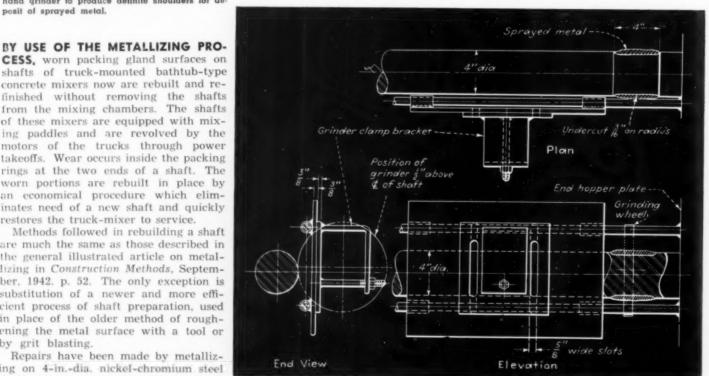


worn portions are rebuilt in place by an economical procedure which eliminates need of a new shaft and quickly restores the truck-mixer to service.

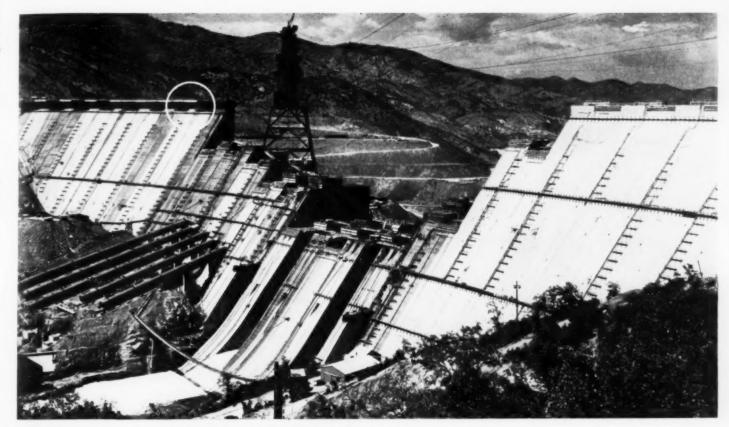
Methods followed in rebuilding a shaft are much the same as those described in the general illustrated article on metallizing in Construction Methods, September, 1942. p. 52. The only exception is substitution of a newer and more efficient process of shaft preparation, used in place of the older method of roughening the metal surface with a tool or by grit blasting.

Repairs have been made by metallizing on 4-in.-dia. nickel-chromium steel shafts of transport mixers rated at 134 cu. yd. when operated as mixers and 2

(Continued on page 110)



GRINDING FIXTURE mounted on two rods parallel with shaft for horizontal movement and fitted with bolt slots for vertical adjustment permits accurate finishing of metallized repair with hand grinding tool fastened in clamp.



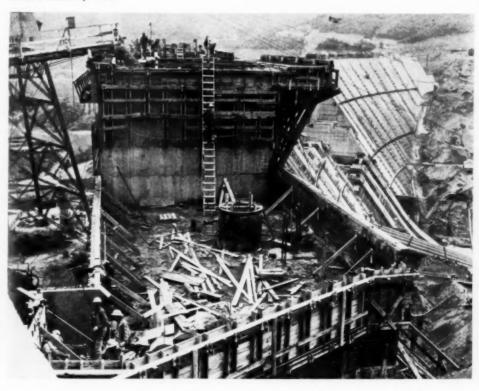
FINAL PHASE of mass concrete placement is under way at Shasta Dam, with less than 1.000.000 cu. yd. of concrete yet to be added to structure. Complete to sidewalk and roadway level at height of 602 ft. is 900-ft. section of right abutment. In circle is Block 58, first to reach roadway level. Massive pipes at left are power penstocks. Varying in length from 807 to 935 ft., they will carry water from reservoir to drive 100.000 hp. hydraulic turbines in powerhouse.

Shasta Dam

Reaching Full Height of 602 Ft.

Nears Completion

WORKMEN are about to write finis to Block 70. Cantilevered section will carry downstream parapet wall and walkway. One more pour will top out block to roadway level.



SHASTA DAM, on California's Sacramento River, attained its full height of 602 ft. early this summer when Pacific Constructors, Inc., under the supervision of the U. S. Bureau of Reclamation, deposited concrete to finished roadway level in Block 58, one of the 50-ft. wide monoliths which form the main body of the huge structure that will contain 6,435,000 cu. yd. of concrete. Concrete placement has proceeded at an average rate of 155,-900 cu. yd. per month since the first bucketful was deposited in July, 1940, and the final pour will be made in less than a year.

Flow of the river, until recently carried through a slot in the center of the structure, is now passing through the diversion tunnel under the dam's right abutment. This tunnel was used by the Southern Pacific Railroad as a bypass around the construction area until the relocated railroad was placed in operation in March, 1942. During that period and later, while preparations were made for (Continued on page 136)

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Roofers' Technique

APPLIED IN LINING TANKS WITH ACID-PROOF SHEETS



HEAT SEALING of joints in acid-proof lining sheets in clarifier tank is done with electrically-heated Stay-Warm knife. Each of forty tanks, $29\frac{1}{2}$ ft. in diameter, requires 2.280 sq. ft. of lining.



BUFFING DOWN of chlorinator cover gasket is done with electrically pow ered grinder prior to painting with Tygon Gel.



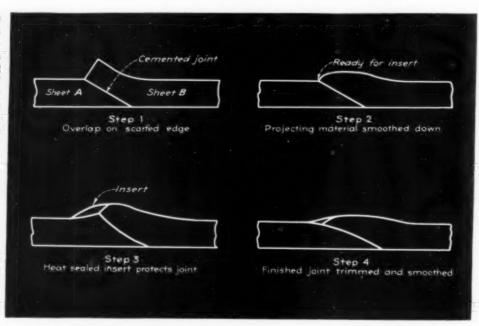
SMALL PIECES OF LINING are lapped in on impeller for turbo-gas scrubber with aid of electrically heated knives. Technique was developed on project for electro-chemical industry.

the

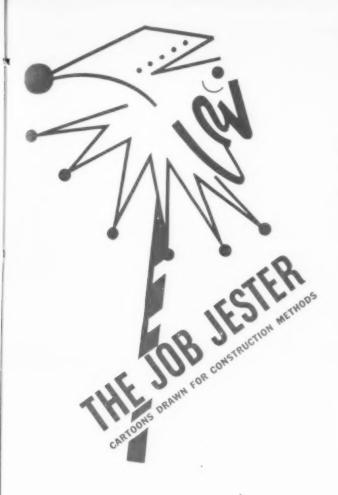
WORKERS SKILLED IN APPLYING **ROOFING** of various sorts were the most likely candidates when the McNeil Construction Co., Los Angeles, began to train men to tackle a difficult job in placing many thousand square feet of acid-proof lining in containers and large pipes for an electro-chemical industry. There was also a great amount of the ordinary sort of rooting to be done, of course, and so this branch of the contractor's organization was properly called the roofing department. It was placed under the direction of K. E. (Kay) Nielsen, a competent, experienced roofer, who picked his men with a view to adaptability.

The major problems were: (1) to discover best methods of applying the protective coatings; and (2) to train inexperienced men so that they could do work that would pass the most rigid tests, for the lining must protect metal from the attack of acids in clarifier and recirculating tanks, in gas scrubbers and in fan housings where highly corrosive gases

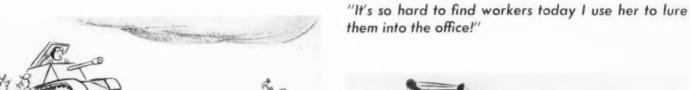
(Continued on page 132)



SEQUENCE OF OPERATIONS followed in making scarfed joint.

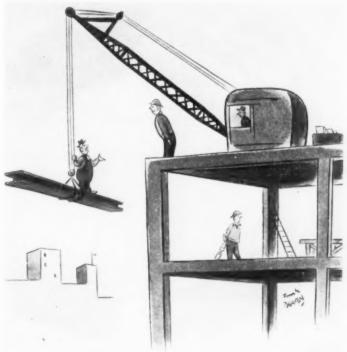








"I think we will get that steel we ordered now that the Army has seen this."



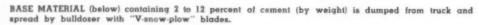
"Drop me a couple floors. It'll cure my hiccoughs!"



PROPORTIONING AND MIXING PLANT of pug-mill type prepares plant-mix, cement-treated base materials for delivery by truck to job.



BULLDOZER AND SPREADER drags wire brush to roughen tread marks of tractor preparatory to rolling. Material is spread 8 in. thick and compacted to net 6 in.

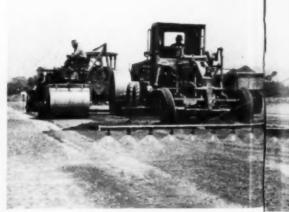






Cement Savings

Are Indicated by
Tests of Plant-Mixed
Base for
Airport Runways



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ROLLERS ranging in weight up to 14 tons compact base material after it has been spread by motor patrol whose blade smoothes out surface waves.



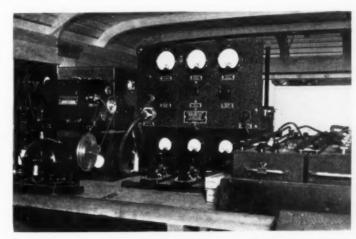
RECORD OF DEFLECTIONS caused by test load in form of carrying scrapers imposing concentrated wheel loads of 33,000 lb. each, (at right) are photographed in instrument truck (at left) and are being examined before equipment is moved to next station.

A SERIES OF EXPERIMENTS on airport runway paving was started recently under supervision of the Corps of Engineers, U.S. Army, to obtain comparative data on plant-mixed, cement-treated base with different percentages of cement content. The general plan of the tests was to lay twelve sections of the runway, all of 6-in. base and surfaced with 2 in. of black top, but with a different cement percentage in each section. All sections were identical except in the matter of cement content of the plant-mix material with which the base was made. The subgrade was treated in a uniform manner and given a thorough compaction. Likewise, the surfacing was as nearly identical as possible over all portions of the pavement. In the base, which was laid and spread 8 in. thick and then compacted with rollers to a 6-in. thickness, the cement content in the six sections was, respectively, 2, 4, 6, 8, 10 and 12 percent by weight.

The test sections were laid out so that an elliptical roadway about ½ mi. long would traverse all six sections. Trucks and carrying scrapers were operated on this roadway while observations and records were made of effects on the pavement under oft-repeated loads. This program is expected to determine the relative durability of the different bases and to show the deflection and the relative length of service before indications of failure develop.

To give a definite basis for this comparison a camera was set up in a truck and films were exposed to record pavement (Continued on page 146)

ADDITIONAL WATER for surface finish (below) is supplied by pipe extended out from water truck and delivering through nozzles directed downward.



RECORDING APPARATUS is set up in instrument truck where photographic record is made of deflection data.



SEAL COAT OF EMULSION (below) is applied to runway to prevent escape of moisture.



September 1943—CONSTRUCTION METHODS—Page 75





KHAKI towns—temporary homes for the boys of our armed forces during their training periods—have been built from coast to coast. In many instances these towns seem to have been built overnight.

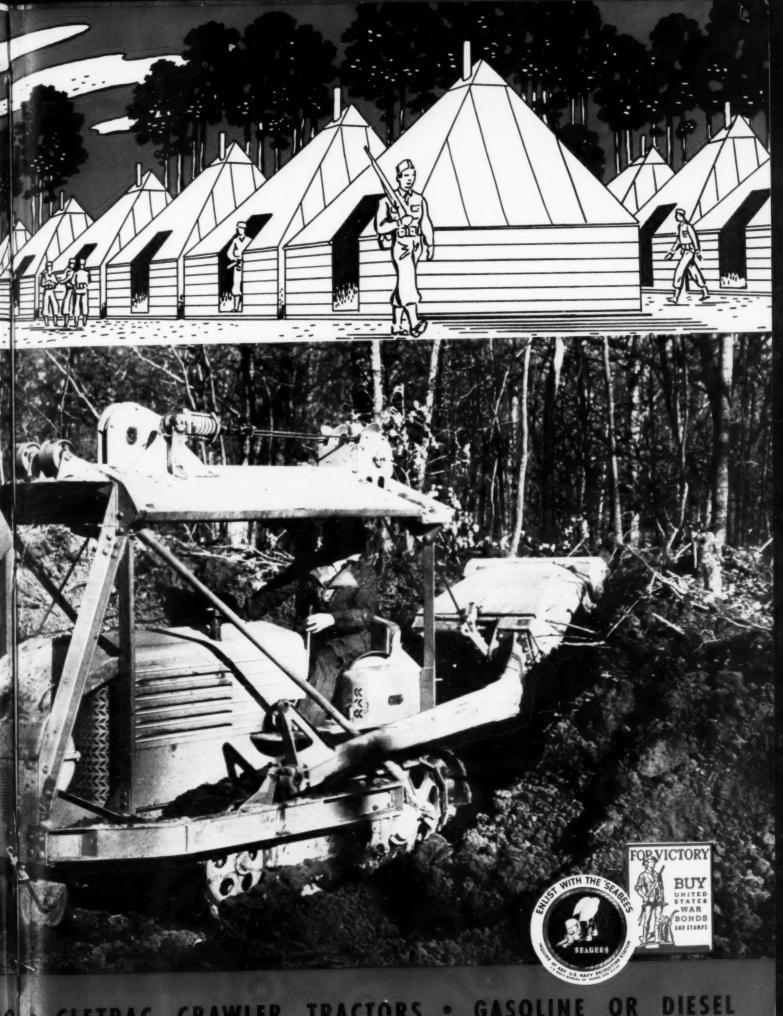
The important preliminaries of clearing and grading the sites for many of these encampments have been done by Cletracs with supplementary equipment, such as the Sargent loader pictured here. Bulldozing, hauling, tree-felling, earth moving, road building—whatever the job, no matter how tough—you'll find Cletracs more than adequate.

The sturdy make-up, rugged power, and enduring qualities built into Cletracs are doubly appreciated today when equipment is difficult to replace.

Keep your Cletracs in fighting trim with frequent inspection, proper lubrication, and prompt repair or replacement of worn parts. Call on your Cletrac dealer for

his experience, facilities and personnel . . . Ask for his advice and suggestions.





DIESEL OR



STRETCHED OUT on base acetate map for aerial reconnaissance. Geological Survey technicians add place names and other data and review compilations already made. Bare feet prevent soiling map.

OFFICIAL OWI PHOTOS

"SPIDER" TEMPLATES of metal (below) are placed in their true longitudinal and latitudinal positions to mark photographic flights in correct geographic course.



New Photographic Method Expedites Map Making

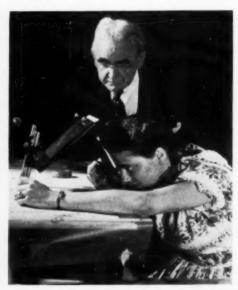
For Air Force Navigation

GREATLY INCREASING efficient operation of the American Air Forces over great stretches of African desert, Asian wastes, South American jungle and Alaskan wilds, more than 1,600,000 sq. mi. of the world's surface have been photographed and mapped during the last 10 months. Pictures taken by the Army Air Forces of areas previously inadequately mapped or not mapped at all are worked up into maps by the Geological Survey of the Department of the Interior at the rate of 5,333 sq. mi. daily.

A new and speedy method called Tri-Metrogon mapping was used. It utilizes three cameras set up in an airplane so that they obtain a set of simultaneous exposures covering an area from horizon to horizon. The oblique photographs overlap the corresponding vertical photo-

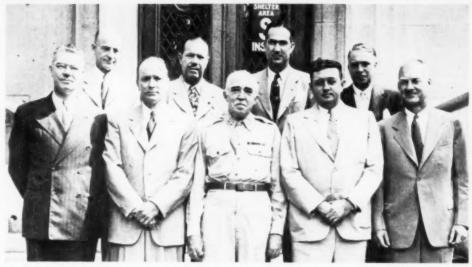
(Continued on page 114)

SELECTED DETAILS (below) are transferred from photograph to base map with aid of Sketchmaster.



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Present and Accounted For... A PAGE OF PERSONALITIES



DIRECTING WAR PUBLIC WORKS AND SERVICES PROGRAMS for Federal Works Agency are seven regional directors who met recently in Washington for conference with MAJOR GENERAL PHILIP B. FLEMING, FWA administrator. In top row, left to right, are C. W. ANDERSON, St. Paul, Minn.; OLIVER T. RAY, Atlanta, Ga.; REX NICHOLSON, Berkeley, Calit.; and JOHN M. GALLAGHER, New York City; and, bottom row, LAWRENCE GILLETTE, Chicago, Ill.; BAIRD SNYDER, assistant administrator; GENERAL FLEMING; KENNETH MARKWELL, Richmond, Va.; and JAMES W. BRADNER, JR., Fort Worth, Tex.



NEW CHIEF ENGINEER of Pennsylvania State Highway Department is C. H. BUCKIUS. Starting as chainman on engineering corps. Mr. Buckius has held every position in construction and maintenance during his more than 30-year association with department.



HEADING NEW HIGHWAY PLANNING SUREAU set up by New Jersey State Highway Commission is SIGVALD JOHANNESSON (left), designing engineer of commission. Goal of bureau is greater efficiency in meeting road problems, especially in post-war period. Mr. Johannesson's experience includes work on design of Hudson River tunnels of Pennsylvania R.R. and New York City elevated railroads and subways and New Jersey's Pulaski Skyway.



DIRECTING OPERATIONS at Dale Hollow Dam on Tennessee's Obey River is M. G. KENNEDY (right), project manager for Morrison-Knudsen Co., Inc., Boise, Idaho. Under his direction are dam, with 1.200 workmen; Obey River Bridge, with 150; and reservoir clearing operations, with 2.500.

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THREE SALVAGE EXPERTS (below) direct biggest ship reclamation job of all time. Discussing progress of raising Normandie, rechristened U.S.S. Lafayette, are left to right, A. C. W. SIECKE, naval architect for Merritt, Chapman & Scott: CAPT. JOHN 1. TOOKER, M., C. & S. salvage master; and CAPT. BERNARD MANSEAU, USN, supervisor of salvage operations for Navy.

BROWN-BELLOWS-COLUMBIA and their construction problems as joint contractors for huge Navy air station come under discussion as S. H. WILDE (left), project manager, sits down with W. S. BELLOWS in latter's Houston. Tex., office (below). These two men. representing Columbia Construction Co. and W. S. Bellows Construction Co., are members of contractors' operating committee with W. A. Woolsey, of Brown & Root, Inc.





TAPE RULES THAT EVERY ENGINEER SHOULD HAVE

Every busy engineer needs a Lufkin Mezurall or Wizard Jr. steel tape rule for his vest pocket—where it's handy and ready for those dozens of little measuring jobs that come up every day.

Ideal for general measuring work—inside, outside, height or depth. They're accurate for both hook or butt end measurements. Six feet long, they remain rigid when extended yet will wrap around corners or curves with ease. Write for free catalog.

BUY THROUGH YOUR DISTRIBUTOR



CONSTRUCTION EQUIPMENT NEWS

SEPTEMBER, 1943, REVIEW of Construction Machinery and Materials

PORTABLE CRUSHING PLANT has capacity of 20 tons of aggregate per hour. Knocked down into five units, primary and secondary crushing plants, sizing screen and bin, control panel, and power unit, it can be transported by truck at 30 or 40 m.p.h. Can be set up and put into operation or knocked down ready to travel in 3 to 4 hr. Ma-

secondary plant, material moves to bin unit where second 4×12 -ft. screen does final grading. Two-compartment bin, 40-yd. capacity, temporarily stores and delivers material to trucks. Plant is designed so that it can be driven by electricity, by combination of diesel and electric power, or by diesel power alone. To insure smooth flow of ag-



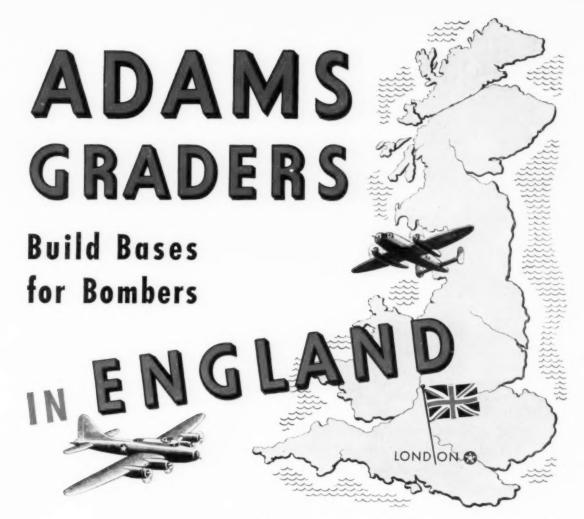
terial is handled in continuous flow from quarried rock to delivery trucks. From steel flight apron of heavy-duty rock feeder, rock is carried into 2540 primary jaw crusher, which will receive any rock that can pass through 2-cu, yd. shovel dipper. Clutch control provides steady flow of rock into crusher and eliminates possibility of crusher choke-off. From primary crusher, material is conveyed to 4 x 12-ft. double deck horizontal vibrating screen. Largest oversize is fed to secondary 1036 roller bearing jaw crusher and next oversize to 4024 roller bearing roller crusher. Tailings of secondary crushers are returned to screen for grading. From

gregates through plant and eliminate breakdowns, primary and secondary crusher plants, vibrating screens, and conveyors are independently driven. Entire plant is operated from central control panel. Primary and secondary plants are mounted on steel goose-neck trailers equipped with fifth wheel and pneumatic tires. Conveyors, which can be dismantled quickly, are carried with secondary crushing unit. Bin legs are equipped with winches which lower sizing screen into bin and bin on to truck. Winches also raise bin and screen into place when setting up. Known as Cedarapids Morok Super-Quarry Crushing Plant.—lowa Mig. Co., Cedar Rapids. lowa.



COLOR HARDENER for concrete floors eliminates need of etching to neutralize alkaline content of concrete, but penetrates and carries color deep into cement. Available in six colors, Dye-Crete color hardener is first applied and allowed to dry from 1 to 2 hr. Finish coat of Defensite coating follows, in same color as first coat if enamel finish follows, in same color as first coat if enamel finish. Uncolored hardener is also available for use when concrete floor is dusting but no color is required. Two coats are essential in using clear material, and non-dusting surface, highly resistant to traffic, results. Coverage should range between 250 and 400 sq. ft. per gal.—Wilbur & Williams Co., Park Square Bldg., Boston, Mass.

LIQUID COMPOUND has been developed for controlling airport dust. Stable homogeneous liquid of relatively low viscosity may be diluted or extended with water in all proportions. Said to be effective in wetting and penetrating over all types of sail, including moist earth. May be applied to soft muddy surface immediately following rain. Because of new type of emulsifier used, new oil will wet only top 2 in. of soil, since it becomes water-insoluble on further penetration, so composition is not dissolved and leached away into soil by following heavy rain. Also claimed to be safe and easy to handle and non-corrosive to metal and spray equipment. Contains effective weed killer.—Curran Corp., 6 Pleasant St., Malden, Mass.



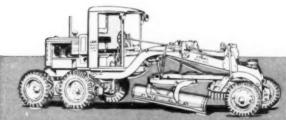


Based at hundreds of airfields throughout the length and width of England are the fleets of Allied bombers that regularly and relentlessly shower

destruction on vital Axis installations. To carve these bases from the rolling countryside, earth moving on a scale unparalleled in English history has been accomplished—a job upon which many ADAMS GRADERS have long been working... At the bases runways and perimeter tracks have been leveled and graded—roads built connecting them with the revet-

ments where planes and stores are concealed. Access roads to the bases, training fields and war factories have been constructed and excavations made for vast underground installations and water reservoirs... In England and throughout the world Adams machines have kept steadily and efficiently at work to complete vital war projects on schedule... After Victory you will find them equally efficient and trouble-free on your peace-time projects!

J. D. ADAMS COMPANY, INDIANAPOLIS, IND.
Sales and Service Throughout the World



Motor Graders • Leaning Wheel Graders Elevating Graders • Hauling Scrapers, Etc. Tillemes

ROAD-BUILDING and EARTH-MOVING EQUIPMENT

WHERE DURABILITY IS VITAL

Rugged and husky, Diamond Roller Chain Drives used on construction machinery are nevertheless as accurately made and as smooth running as those used on the finest precision machinery.

Consisting of a series of roller bearings—they flow power from engine to shaft or shaft to shaft with roller bearing smoothness and efficiency. The hardened roller parts are heat treated for wear resistance, and the tension members are treated to insure high tensile strength. There is no compromise in Diamond Roller Chain design.

Not depending on friction they are easy on the machinery bearings,—they waste no power, require minimum space, and have the durability and reserve power to withstand long periods of heavy going without slip, creep or stretch, nor loss of efficiency.

Leading manufacturers regularly use Diamond Chains because of their proven performance—good reason to insist on Diamond for any of your drive requirements or replacements. DIAMOND CHAIN & MFG. CO., 418 Kentucky Avenue, Indianapolis 7, Indiana. Offices and Distributors in All Principal Cities.



Page 82 - CONSTRUCTION METHODS - September 1943

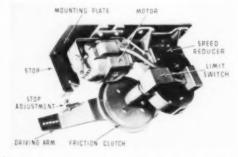
MASONRY SAW is completely portable and powered to efficiently cut dense Fire or Acid brick. Flexible foot pedal operation eliminates need for adjustments when cutting varying material sizes. Straight, angle, or "outlet" cuts can be instantly made. By utilizing series of rapid cuts which auto-



matically discharge cuttings and eliminate frictional heat, blade is kept cool and blade life increased more than 50 percent. Spring acts as cushion, automatically equalizing and synchronizing blade pressure. Ball-bearing wheels assure gliding feather touch, giving operator positive feel and control of cutting at all times. Adjustable head is instantly demountable for storage.—Clipper Mfg. Co., 4030 Manchester St., St. Louis. Mo.



SWINGING DOOR OPERATORS are designed for one, two, three, and four-leaf inward and one-leaf outward swinging doors. Complete motor unit consists of motor, speed reducer, adjustable friction clutch and driving arms, and limit switch. Sturdy bracket is provided for wall mounting. Doors are opened or closed in one-half revolution of drive shaft which requires 16 sec. on standard



operator, but faster speeds can be furnished for smaller, lighter doors when approved by factory. It door is stalled, due to obstruction, clutch will slip only until drive shaft reaches end of normal strake and limit switch then stops motor in usual manner. This assures maximum protection of unit, since it is never overloaded longer than required to complete opening or closing strake. In case of power failure, connecting link may be disconnected from door arm to permit manual operation of door.

—Barber-Colman Co., Rockford, III.

THE Fighting Town

INSPECT LUBRICATE ADJUST REPLACE Look your equipment over frequently. For expert "internal" inspection of operating parts or functions, call in a trained "Caterpiliar" service man. READ YOUR OPERATOR'S INSTRUCTION BOOK.

Use the right oil at the right time in the right place and in the right quantity. Keep the oil clean—change before it becomes dirty and deteriorated. FOLLOW THE OPERATOR'S INSTRUCTION BOOK.

Tighten all bolts. Keep fan belt and tracks at proper tension. READ THE OPERATOR'S INSTRUCTION BOOK. For fuel injection valves and other precision adjustments, let your experienced service-dealer do the work. He'll do it well.

Have your service-dealer replace or repair worn bearings, track rollers, pins and bushings, sprockets, cylinder liners, clutch linings. His service helps restore power
and extend equipment life. Saves critical materials, too.

REE are the four things which are essential in keeping your "Caterpillar" Diesel Tractors in vigorous fighting trim: Inspection—Lubrication—Adjustment—Replacement. Call them to duty ahead of trouble . . . and until the day when you can again get all the new "Caterpillar" Diesels you want, they'll add days, weeks, months of valuable service life to your present units. There's scarcely a "Caterpillar" Diesel Tractor, Motor Grader, Engine or Electric Set—regardless of age or usage—that hasn't a lot of dependable working hours left in it.



CATERPILLAR DIESEL

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

TO WIN THE WAR: WORK-FIGHT-BUY U. S. WAR BONDS!



"We're the SEABEES of the Navy We can build and we can fight"*



Wake Island! Guam! Cavite! Jap bombers roared over our advance Pacific bases . . . Jap warships appeared off shore . . . civilian workers fought side by side with the marines-swinging wrenches, chisels, hammers-in hand-to-hand combat with the Jap invaders. Courage! But courage alone wasn't enough . . .

That was at the start of the war. Then came the Seabees—the Construction Battalion of the U.S. Navy—not only equipped to build, maintain and repair advanced bases overseas, but armed and trained to defend them, too.

And wherever there are Seabees, there's likely to be Telsmith equipment—Telsmith portable or semi-portable crushing-screening plants, or complete large scale aggregate producing plants. Although almost all current production goes to the Navy, Telsmith equipment is available to contractors doing war work. Get Bulletin E-10.

* From "The Song of the Scabees," copyright 1942 Robbins Music Corporation. Used by permission of Copyright Proprietor.

ELSMIT

Portable Crushing-Screening Plants

Telsmith 10" x 21" General Utility Crushing Plant equipped with Telsmith Roller Bearing Jaw Crusher, bucket elevator and power unit. (Inset shows outfit with elevator folded.

SMITH ENGINEERING WORKS, 510 EAST CAPITOL DRIVE, MILWAUKEE 12, WISCONSIN

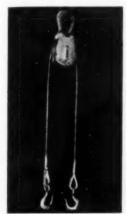
Cable Addresses: Sengworks, Milwaukee-Concrete, London

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Room 1604—50 East 42nd St.
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713 Commercial Trust Bldg.
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Cambridge, Mass.
Cilft L. Priester
Roanoke, Va.
Clift L. Priester
Wilson-Weesner-Wilkinson Co.
Knoxville 8 and Nashville, Tenn.



LEVEL-LIFT SLING handles three ton loads. Has special patented feature that enables feature that enables rope to equalize itself and lift unbalanced loads level. Makers claim it is simple, easy to use, and saves time and labor, especially in handling long pipes, boxes, steel, and flasks. Made in one size for handling loads up to three tons using one unit or up to six tons when used in pairs .-Macwhyte Co., osha, Wis.

. . .

FIRE PROTECTOR is said to protect industrial coal piles from danger of spontaneous combustion. Long rodlike instruments are inserted in coal piles at intervals of about 20 ft. If overheating starts, signals pop up to indicate that temperature of 150 deg. F. has been developed at that point. Then quenchers loaded with dry ice are forced down and gasses freeze hot spots to prevent ignition. Through vents in quenchers cu. ft. of dry ice will expand to more than 700 times its volume in CO₂ gas at 150 deg., so 100 lb, of dry ice will more than fill interstices of one carload of soft coal.

—Coal Specialties Co., 50 Church St., New York, N. Y.

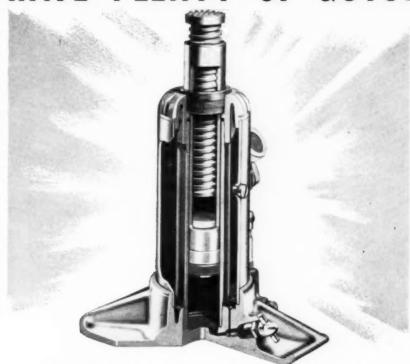


METAL SAW is now available in wet cutting model. Pump is non-clogging piston type, driven by noiseless cam and mounted in frame without impairing overall streamlining of machine. No additional power is required, as it is taken from present drive gear, thus eliminating need for sep-



arate motor. Ingenious power take-off eliminates special wiring and extra switches. Speed of pump is automatically regulated by speed of machine. Flow of coolant is in direct relation to blade speed. Pump automatically stops and starts with machine. Steady flow of coolant is insured through use of ram which smoothes pump impulse. If dry cutting is desired, pump can be readily disconnected.—Johnson Mig. Corp., Chrysler Bldg., New York. N. Y.

THESE HYDRAULIC JACKS HAVE PLENTY OF GUTS!



Ever see the "insides" of a hydraulic jack? If not—take another look at the above cross-section and you'll come to this very important conclusion:

There MUST be a difference in Hydraulic Jacks!

And you're right—there IS! Each jack manufacturer has a choice of various types of materials for the several dozen parts that go into the jack. And it stands to reason that these materials, will be of varying degrees of quality, workmanship and design efficiency.

Blackhawk Jacks have a reputation for top performance, depend-

ability and freedom from maintenance — and it's that *extra* in quality, design and workmanship that wins this reputation. That's why "Blackhawk" is specified by experienced Hydraulic Jack users throughout construction and industry.

Blackhawk Jacks are available in capacities from 3 to 50 tons. See your Blackhawk Distributor — or write for the new V-43 bulletin.

A Product of BLACKHAWK MFG. CO.
Department J2393 MILWAUKEE 1, WIS.

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LIKE THE SPEED . . . MOBILITY . . . FIRE-POWER OF A MODERN FIELD-PIECE

Rapid Heating of Oils and Bituminous Materials — On The Job As Needed —Is A Certainty With CLEAVER-BROOKS Heaters and Boosters.

Your crews are not delayed — there's no waiting for road oils or bituminous materials to be brought to application temperatures—when there is a Cleaver-Brooks Tank Car Heater or Booster on the job.

High-speed, economical performance is due to the original and exclusive Cleaver-Brooks four-pass, down-draft flue travel and integral burner construction plus the positive dry-coil method of condensate return.

Cleaver-Brooks Tank Car Heaters are available in two and three tank car sizes — Portable Pumping Boosters in two capacity sizes, with truck mounting or 4-wheel trailer. Write for complete information.

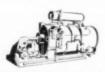
Cleaver-Brooks Co., 5125 No. 33rd St., Milwaukee, Wisconsin, U.S.A.

Cleaver-Brooks

TANK CAR HEATERS . . . BITUMINOUS BOOSTERS . . . AUTOMATIC STEAM PLANTS







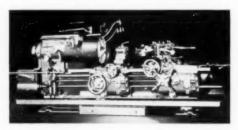
SWEAT BANDS give employees greater comfort for hot weather work. Outside covering of patented process insoluble Aldex assures silky-cool, non-irritating forehead contact. Cellulose fiber filler



within band absorbs perspiration immediately on contact. Fit any size head and are so constructed that shape is maintained even when completely saturated. Are rugged enough for rinsing, drying, and re-use. Made entirely from non-critical material.—Aldine Paper Co., 373 Fourth Ave., New York, N. Y.



HEAVY-DUTY TURRET LATHES, Type H, are announced in five standard sizes with different size spindle bores to accommodate various classes of work. Bed and headstock are cast in one piece from alloy semi-steel. Hardened steel wavs, wide and flat, are securely dovetailed into bed casting without bolts or screws. Lever on headstock operates clutch and spindle brake simultaneously. Speed selection is controlled by three levers. Motor has NEMA Type B flange mounting with special



shaft extension and drawing pinion is mounted directly on motor shaft. Headstock transmission provides eight spindle speeds, but 16 speeds are obtainable with two-speed motor. Coolant system is built in machine and so arranged that an adequate supply of coolant may be delivered at chuck or through central distributing point at center of turret. Chucks are of extra heavy design to handle every form and variety of material found in turret lathe work. Bar feed attachment provides for bar feeding by means of carrier which slides on substantial semi-steel bed.—Libby Division. International Machine Tool Corp., Indianapolls, Ind.





FOR BIGGER PAYLOAD DIGGING

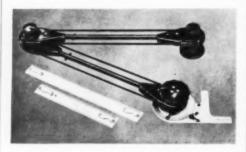
Engineered all the way through to do the job. Backed by fifty years of specialized manufacturing skill and experience. The pay-off bucket for better, more efficient 1943 work.

Haiss Hi-Power has the brute strength for heavy digging, and the power in its bite to yank loose an embedded boulder. Weight and closing power combine to dig deep and tear out a heaping bowlful at every grab. Alloy steel parts for abrasion resistance, long bearings for longer wear.

Bucket agencies throughout the country. Write, wire for prices, delivery and catalogs.

GEORGE HAISS MANUFACTURING CO., INC. 139th St. & Canal Place, New York 51," N. Y.

SMALL DRAFTING MACHINE can be mounted on portable board and used in shop or field. Weighs only 3 lb. Includes accurate parallel motion over entire board; full circle baseline setting; prelubricated and double-sealed ball bearings: and inclosed pulleys. Disk brakes at anchor and elbow



allow use on steeply inclined boards. Central skid button is plastic and will not mar paper. Lightweight aluminum scales are available in 8- and 12-in. lengths and fit into resilient, slotted chucks in positive scale holder. Protractor is 334 in. in diameter and graduated in degrees with figures Is flexible so that scales lie flat by quadrants. head can be readily raised high off board. V & E Mfg. Co., Pasadena, Calif.



PROTECTIVE COATING for concrete, stucco, and brick uses non-critical materials exclusively. Keeps excess moisture out of masonry and lets it out as water vapor if present in excess. Four-year laboratory research by company showed that irreversible inorganic gels practically "weld" themselves into minute voids of masonry materials and harden into heavy coating of microscopic spongelike character, which impedes penetration of water from exterior but permits escape of water vapor developed by abnormal temperatures. Known as Waterfoil, new coating does not contain linseed or tung oil, varnish, lacquer, resinous emulsion, or volatile thinners. Comes in five basic colors.— A. C. Horn Co., 43 Tenth St., Long Island City (1), N.Y.

NEW WIRE ROPE FITTING, known as "shimble," is combination wire rope shackle and thimble. Made from structural steel bars that are heated, bent and forged to shape to form safe and economical device said to be safer than ordinary shackle and to give greater protection to wire rope than extra heavy thimble. Made with open and closed ends in all standard sizes of wire rope. Practical wherever shackles or sockets are commonly used, such as on guy an-charages, tractor hitches, crane slings and boom toppings. also be welded to other connections.—Garlinghouse Bros., 24

E. 16th St., Los Angeles, Calif.



"Electricity for any Job — Anywhere''

ONAN GASOLINE DRIVEN ELECTRIC PLANTS provide electricity for construction projects remote from commercial power sources, and for emergency and standby service.

Thousands of these reliable, sturdy plants are doing a winning job on all the fighting fronts, providing electricity for many vital war tasks.

Ratings from 350 to 35,000 watts. A.C. 50 to 800 cycles, 110 to 660 volts. D.C. 6 to 4000 volts. Also dual A.C. and D.C. models. Also are water

water cooled.



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Cranes, Elevators, Lift & Trailer Trucks, Conveyors, Live Skids, Drum Hoists, Winches, Tool Wagons, Carts.

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30 CHURCH ST. . NEW YORK 7, N. Y.

HEAVY-DUTY CARBIDE TOOL GRINDER, Model EE, can be supplied for wet or dry grinding. New model is completely redesigned, with massive streamlined base, improved wet grinding equipment, better method of motor mounting, and other modifications. Includes quick-acting indexing tables, which permit instant setting accurately to desired angle, so it is never necessary to raise or lower table since edge always remains at same point with respect to face of wheel. High-grade spindle runs in double row, self-aligning, precision ball bearings, with labyrinth dust seal, and is mounted in heavy one-piece yoke. Drive is by means of double V-belts from motor, which is mounted on hinged base, giving automatic belt tension. Vibration is reduced to minimum and speed of spindle



provides maximum grinding efficiency. Wet grinding equipment consisting of coolant pump, pan, settling tank, piping, and nozzles, provides copious flow of water and permits faster grinding without checking or cracking carbide tips, resulting in less wheel wear. Nozzles are arranged so that flow of coolant can be directed on tool regardless of which side of either wheel is being used. Grinder uses either diamond or silicon carbide cup wheels on either end for grinding of carbide tools, or aluminum oxide roughing or finishing wheels for grinding high-speed steel, stellite, etc. Wheels are mounted on steel backing plates, with adequate compensation for wheel wear, so wheel can be kept close to tables and used up practically 100 percent. Totally inclosed dust-proof motor of standmanufacture is furnished, with high-grade drum-type on-off reverse switch so roughing and finishing of both right- and left-hand tools can be done conveniently with wheels always rotating toward cutting edge of tools. Drill grinding at-tachment and diamond wheel dresser can be furnished.—Thomas Prosser & Son. 120 Wall St., New York 5, N. Y.



RUST PREVENTIVE COMPOUND is available for metal stored outdoors. Can also be applied to metal or machinery stored indoors that is subject to frequent handling or abrasion. Tectyl 506 consists of mixture of solvent and chemicals that deposits polar film on evaporation of solvent. May be applied by dipping, spraying, or brushing. Removable by any common solvent, as kerosene, gasoline, or carbon tetrachioride.—Valvoline Oil Co., 585 E. Fifth St., Cincinnati, Ohio.

Answers to Your Questions About

THE POSTWAR

CUMMINS DEPENDABLE

DIESEL

Question: We are told that miraculous, revolutionary developments in plastics, electronics, aviation and many other fields of industry merely await the ending of the war. Will this hold true also of the postwar Cummins Dependable Diesel?

Answer: The postwar Cummins Diesel will not be a "miracle" diesel. The dramatic, pioneering stage of diesel development which caught the public's fancy a decade or so ago has passed. But the man who understands diesel engines in relation to the power needs of heavy-duty industry will find many "revolutionary" features about the new models, in the sense that he will be able to use the Cummins Diesel in many new ways and places and equipment . . . and use it at a considerably lower cost than ever before.

Question: Is it possible now to say what new features the postwar models will have?

Answer: Only in general terms. Specific details are at present marked "confidential" for obvious reasons. Then, too, the picture is ever changing—today's specifications might be altered by tomorrow's findings. We can say, though, that these new features apply to almost every phase of design and operation... cooling, lubrication, material specification, etc. All changes will have the vitally important over-all effect of increasing horsepower output per pound of engine weight... simplifying and reducing maintenance requirements... extending the engine's efficient "work life."

Question: Is the development of postwar models being carried on as an independent project, separate and apart from Cummins' production-for-war program?

Answer: No. Just prior to the war, we completed one of the finest diesel research laboratories in the country. We expected to use it exclusively for the development of future models. But with the coming of war, this laboratory—like every other facility we possess—was turned over to research projects directly connected with our present production for the armed forces. For example: scarcity of a certain metal or alloy may threaten production. The lab turns to a search for a substitute, frequently comes up with a material better than the

original. Or, certain engines may be destined for service where extreme and unusual operating conditions exist. In the laboratory, these specific problems are solved, perhaps by a minor change in cooling or lubrication, and this change may be worth incorporating on all models. Thus it is that the improvements and refinements you will find on your postwar Cummins Diesel are the direct result of our efforts to give our fighting forces the best fighting tools we know how to build.

Question: Will postwar models make current or prewar models obsolete, from the standpoint that parts for old engines will not be available in the future—or interchangeable with parts for new engines?

Answer: No. It has always been a cardinal point in Cummins policy to assure the continued operation of the engine by providing replacement parts, regardless of how old the engine may be. Furthermore, we are constantly trying to reduce the owner's maintenance problems and we know from experience that one of the best ways of doing this is by preserving the interchangeability of parts to the furthest extent consistent with sound design and operating efficiency. It has never been in our scheme of things to make an annual event of "new models." Improvement and refinement are a painstaking, continuing process. True, war has greatly stimulated this process . . . enabled us to do ten years' work in one or two. But war has in no way swerved us from our purpose . . . which is to make each day's Cummins Diesel better than the day's before . . . but to make every owner who bought a Cummins Diesel yesterday glad that he owns it today.



CUMMINS ENGINE COMPANY . COLUMBUS, IND.





★★ Immediate delivery on Gasoline Powered 1½ H.P., and wheelbarrow or round base mounted 3 H.P. units on suitable priority.

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- * Place a stiffer mix faster.
- * Eliminate honeycombs and voids.
- ★ Get a better bond with reinforcement and a stronger water tight job.
- * Strip forms earlier.

■ MALL Gasoline Powered Vibrators are the most useful tools any contractor could own. They are ruggedly constructed to stand up under hard, continuous usage. They operate in the most remote places. They can be easily transported anywhere on the job. In addition, the variable speed engines start easily, run all day on very little fuel and require little attention.

8 swivel-fitted attachments, quickly interchangeable with the vibrating element are available for Wet Wall Rubbing, Form and other Sanding, Sawing with Circular Saw, Wire Brushing, Grinding, Drilling in Wood, Brick, Steel or Stone, Pumping and Sharpening Tools. With the present scarcity of time, labor and materials and a competitive future facing you, the need for this equipment was never greater. Write at once for full information.

MALL TOOL COMPANY

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GRACO CONVOY LUBERS FOR HIGH PRESSURE FIELD LUBRICATION • The value of "On-the-Job" air-powered lubrication of trucks tractors scrapers... shovels graders and mechanized equipment of war, has been proven repeatedly by users of GRACO CONVOY LUBERS. Your equipment will work faster and last longer if lubricated regularly by a CONVOY LUBER. Investigate its advantages, See your equipment distributor write for complete details. GRAY COMPANY, INC.
MINNEAPOLIS 13, MINN.

BEAD-LOOSENING TOOL can handle tires of virtually any size, including huge earthmover varieties, with ease and speed. Provided in kit 38x6x6½ in. and weighing 48 lb., which also contains enough equipment to carry through all work of demounting tire and mounting it again. Developed by W. H. McCOLLISTER, veteran research man,



bead-loosener includes metal bar, hooked at one end, with adjustable lever attached near straight end of bar, and two adjustable hooks. Cannot injure tire or rim if properly used. With tire laid flat and deflated, tool utilizes system of hooks and leverage to force any bead loose from rim in few minutes. With tool in kit are valve holder, valve repair tool, valve extension, tire irons, hammer made of rubber and metal, and strap.—Firestone Tire & Rubber Co., Akron, Ohio.



HOLLOW-SHAFT SYNCHRONOUS MOTORS are furnished in ratings from 100 to 1,000 hp., and in speeds from 514 to 1,800 rpm. Especially useful for pumping applications where large volume of



fluid is handled, such as ordnance and synthetic rubber plants, and municipal and government water projects. Have drip-proof inclosure for protection. Are streamlined throughout to provide pleasing appegrance and smoothly contoured lines will not easily collect dirt and dust. Top cover is removable to permit adjustment of pump shaft. Easy access to brushes collector rings is obtained by unlatching flush-mounted steel plate. Frames are of

which provides strength to withstand high-thrust loads often encountered in pump applications. Can be furnished with non-reverse ratchets to prevent reversal of pump rotation at shutdown or starting. Also available in solid-shaft construction.—Motor Division, General Electric Co., Schenectady, N. Y.



CENSORED

Your new BAY CITY enlisted for has the duration.

CENSORED

Your present equipment, working 'round-the-clock will last longer and continue to perform efficiently if these common-sense rules are followed:

insure proper regular lubrication

provide daily inspection to detect troubles while they are still small

make adjustments when needed-don't wait

tighten loose bolts and nuts

keep fuel, lubricants and water clean

remove clutch and brake bands and clean lining with good grade of clear gasoline

change cables end-for-end to increase life of wire rope

plan work to favor machine

inspect engine regularly flush radiator when dirty

always give model and serial numbers when ordering repairs

contact your BAY CITY distributor for parts and servPhoto U. S. Navy

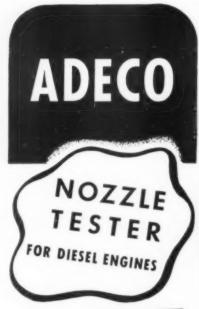


Sorry we can't tell you where these BAY CITY cranes are-they have gone to war. These 20 ton capacity cranes-one on crawlers and one on rubber-will be available for your post-war construction. Then, their high performance and low operating costs will give you a new measure of values in crane efficiency. While BAY CITY convertible equipment is now going only to the Armed Services, we will gladly mail you catalogs so you will have them when needed.

BAY CITY SHOVELS, INC.

BAY CITY, MICHIGAN







HOW TO KEEP DIESEL ENGINES RUNNING AT PEAK EFFICIENCY

With this sturdy, portable, light-weight Adeco Nozzle Tester, any mechanic can easily make quick, accurate tests on injector opening pressure, spray pattern, etc.; and detect stuck needle valves and leakage around valve seats. Adeco advantages have made this America's most widely used nozzle tester. Tests both large and small injectors, on bench or engine. Avoids costly delays and possible damage to engine. Keeps diesels operating at peak efficiency.

· Write for new illustrated bulletin.

AIRCRAFT & DIESEL EQUIPMENT CORP. 4401 N. RAVENSWOOD AVE. CHICAGO, ILLINOIS CIRCULAR CUTTING TOOL speeds ring-connector wood construction. In preparing timber for ring-connector joints, grooves are cut concentric with bolt holes in rabbetted overlapping ends of timbers to be joined. Depth of circular grooves is about half width of rings. Before joint is assembled, rings are inserted in grooves on one of joining



timbers. As timbers are drawn together by tightening through-bolts, protruding rings in one face enter grooves in other face. Larger bearing area of rings utilizes much greater percentage of bearing strength of wood than when bolts alone are used. Cutter is made with either two or four renewable blades for split rings from 2½ to 6 in. in diameter. May be driven by portable electric drill or drill press or used in hand-operated brace and bit. Different type cutting head, with inside blades, is furnished to countersink bearing plates of same diameter as connector rings.—Circo Tool Co., 254 E. Ogden Ave., Milwaukee 2, Wis.

COMPACT PREHEATING UNIT aids cold-weather starting of heavy-duty equipment, such as snow scrapers, plows, tractors, and shovels. Developed for airplane use, it greatly speeds take-off and



saves motor wear. Weighs only 38 lb. and can be carried by one man like suitasse. Produces 90,000 B.t.u. of heat per hr. and utilizes 92 percent of all heat units in burning gasoline it uses for fuel.—York Heat Division. Thos. Shipley, Inc., York Pa.

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are working for Uncle Sam

> If your supply house cannot furnish you with Coffing Hoists when you want them you may be sure that Uncle Sam's orders are being filled first because we are certain he is placing them where they will do the most good. Coffing Hoists are also helping skilled labor to do the job better and faster on our production front.

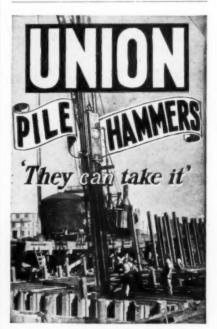
COFFING HOIST CO.

Manufacturers of

Ratchet Lever, Spur Geared, Electric and Differential Hoists I-Beam Trolleys Utility Maintenance Tools

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Ready! -for quick reference and ALL FACTS on what UNION makes for speedy plant construction write or wire NOW for Catalog 184E.

Union Iron Works, Inc.
ELIZABETH, New Jersey



When it comes to fast and dependable foundation work, many of the country's busiest engineers and contractors prefer Union Metal Monotubes for the installation of cast-in-place concrete piling. And one of the features of these all-steel tapered pile casings which they like best is their SPEEDY DRIVING qualities. Tapered Monotubes are so strong and rigid they require no heavy core or mandrel, and can be driven with average job equipment (crawler crane equipped with standard leads and hammer).

Other outstanding Monotube features are:

SPEEDY HANDLING — Monotube steel casings are light in weight, can be handled quickly and economically.

SPEEDY EXTENSION — Use of Extendible Monotubes proves economical and speedy where varying ground conditions require a wide variety of lengths.

SPEEDY INSPECTION — Hollow tubular design enables you to inspect casings quickly and thoroughly from top to toe before concreting.

Monotubes are available in gauges, tapers, and lengths to meet varying soil conditions. Write for your copy of the Monotube Catalog 68A containing additional valuable information.



THE UNION METAL MFG. CO.

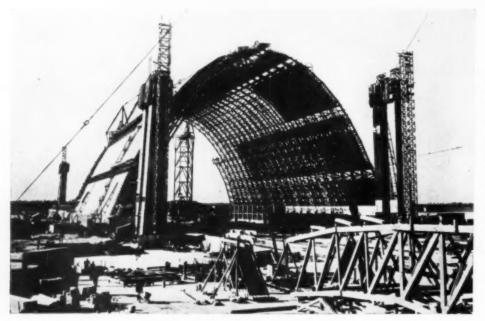


Buy and KEEP More and More War Bonds

Engineering in Wood."

TIMBER STRUCTURES INC.

BUILDS FOR TODAY'S "MUSTS".



STRUCTURE: One of many similar blimp hangars for the Navy which Timber Structures, Navy which Timber Structures, Inc. has fabricated and fireproofed. 1000' long; 235' wide; 185' high. Big enough for 10 football fields; high as a 17-story sky-scraper. 2050 tons of steel were saved by Navy's use of modern timber design fabrication and treatment. TECO connectors and their use procedure as developed and made available by the Forest Products Laboratory and The

WORLD'S LARGEST TIMBER

Products Laboratory and The Timber Engineering Company, (subsidiary of National Lumber Manufacturers Association), helped greatly to make these structures economically possible in wood.



PLYWOOD PLANT, Peninsula Plywood Corp., Port Angeles, Wash. For this 265'x 404' building 90-64' trusses were provided by Timber Structures, Inc. Engineer: J. H. Stevenson. Contractor: A. S. Hainsworth Construction Co., Seattle, Washington.



ERECTED IN FOUR 8-HR. SHIFTS. Mold loft for Kaiser's famed Oregon Shipbuilding Corp., Portland, Oregon. Trusses, columns, framing were designed, fabricated and erected by Timber Structures, Inc. Architect: Wolff and Phillips, Portland, Oregon,

Today's musts in timber construction include blimp and airplane hangars, army depots, shipyards, cantonments, war plants of all kinds.

To this entire field Timber Structures, Inc. has helped bring Engineering in Wood, just as it did to civilian construction before Pearl Harbor, just as it will do again for the postwar building certainties of industry, agriculture, highways, municipalities.

Engineering in Wood is many things: Research, design, engineering, prefabrication, transportation, erection. All are part of Timber Structures service to

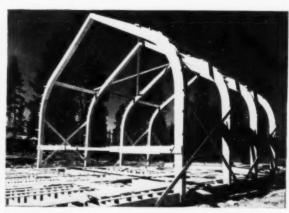
contractors, engineers, architects, management. All are responsible for the construction speed, economy, strength and permanence of roof trusses and other timber structures and items supplied by this organization.

For today's musts and tomorrow's certainties, we are prepared to serve you in timber and other structural materials. Write or wire for any specific data on work under consideration. For informative literature on the jobs Timber Structures, Inc. has done, is doing, mail the coupon.

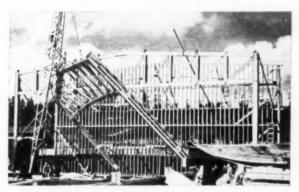
PLANS FOR TOMORROW'S "CERTAINTIES"



PAN-AMERICAN HIGHWAY. Bridges like this (50' - 70' - 90' lengths) were completed and shipped by Timber Structures, Inc. 18 days after order was received—15 days ahead of schedule.



CHAPEL. Prophetic of tomorrow's church construction is this army chapel (one of many) for which Timber Structures, Inc. fabricated and erected glued laminated arches.

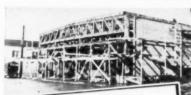


THEATRE, built for the army and indicative of postwar theatre construction utilizing trusses by Timber Structures. Inc. Contractor: Sound Construction & Engineering Co., and Peter Kiewit & Sons' Co., Seattle,

WAREHOUSE, 200°x 300° for Woodbury and Co., Portland, Ore. Roof trusses for this modern building designed, fabricated and erected by Timber Structures, Inc. Architect: Richard Sundeleaf; Contractor: Wegman & Son; Structural Engineer, Miles K. Cooper; Portland, Oregon.

MARKET for Safeway Stores, Inc., Gresham, Ore. Typical of Safeway Markets is this 60' x 100' concrete building with roof trusses by Timber Structures, Inc. Architect: Barrett and Logan, Portland. Contractor: Knott, Rogers & Dunbar, Portland.





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INCORPORATED

Portland 8, Oregon New York 17, N.Y.

TIMBER STRUCTURES, Inc.
Send Book "Engineering in Wood"

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Address

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An Owen digging bucket is specifically designed to be dropped on the material so that the teeth and lips hit hard and dig in. Thus, they get "a mouthful at every bite" in the hardest digging material.

task of the operator and making it pos-

sible for him to haul more loads daily.

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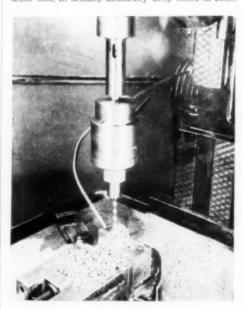
Only a minimum of effort is required to haul materials in Sterling Wheelbarrows. Perfectly balanced construction puts 80% of the load on the wheel, thus easing the



Look for this Mark of STERLING WHEELBARROW CO., MILWAUKEE, WIS.



DRILLING DEVICE, known as Rego Karweit Driller, interchangeable with conventional chuck, is reported to greatly increase production while using stand-ard drilling machines. May be operated at hand-book cutting speeds and feed rates with ordinary drills and, in drilling unusually deep holes in some



materials, drilling time may be cut in half. Cutting speeds can also be increased as much as 25 per-cent above handbook ratings, thus effecting large additional increase in production. Driller automatically produces at cutting edges of drill small uniform chips that clear drill flutes easily. Surplus coolant or lubricant washes chips away and lubricant serves as coolant to bathe both sides of cutting edges of drill at every revolution.—Bastian Blessing Co., 4203 Peterson Ave., Chicago 30, Ill.



FOOD CONTAINER is announced in which hot and cold foods, packed side by side to form complete meal, can be served workers in war plants. sists of five earthenware food and beverage compartments, insulated within durable pressed steel finished in several standard colors. Each com-



partment is sealed with snap-in paper covers. Menu for ordering next day's meal is inclosed and entire container sealed for delivery to worker who ordered meal. Seal-Lock applied at kitchen or caterer's carries worker's shop number to permit ready identification. When unsealed, top lid becomes comfortable lap tray for holding container. Available for duration only to essential war plants, shipyards, and mines.—Mealpack, Inc., 152 W. 42nd St., New York, N. Y.



1. Teamwork between the field ambulance service and our fighting forces is one of the marvels of this global war. Five days from the time one of our wounded heroes left a South Pacific base, he was watching a ball game at Boston, Mass. To accomplish this in World War I would have taken months instead of days. This is only one instance of how teamwork and devotion to duty are safeguarding the lives, health and comfort of our armed forces.

2. "Conservation of trucks and trailers requires an effective and united plan of action," states J. L. Keeshin, President of Keeshin Freight Lines, Inc., Chicago, Illinois. "Management, drivers and mechanics must all be impressed with the importance of vehicle conservation. Good driving, proper maintenance, a comprehensive safety program and one hundred per cent teamwork will keep 'em rolling to meet the increasing demands of war industries."

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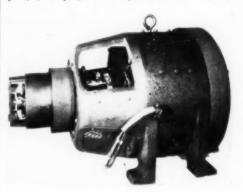
ACETYLENE AND ARC WELDING SHIELDS have patented locking device and comfortable, easily adjustable headgear. Locking device holds shield in correct position before face to assure that line of



vision passes through lens at right angles to surface of glass. Also holds shield firmly above head while welder is preparing, chipping, or surveying work. Slight nod of head will lower it to correct working position. Range from 1 to 1½ lb. in weight.—Davis Emergency Equipment Corp., 55 Halleck St., Newark, N. J.



REVOLVING ARMATURE TYPE GENERATOR is good machine for synchronizing. Model 55 Katolight has rated capacity of 25 kw. at 80 percent power factor; single phase, or 30 kw. at 80 percent power factor, three phase. Is 38 17/32 in. long by 24½ in. wide by 24¾ in. high and weighs approximately 1,375 lb. Separately excited, six pole, 1,200 rpm., with damper windings. Made in



all standard and special voltages. Designed for direct attachment to engine bell housing and also available as independent generator with standard shaft extension. Has high carrying capacity and long life brushes, with brushes and brush holders easily accessible for adjustment and replacement. Armatures are statically and dynamically balanced to closest possible tolerance. Can be furnished for either direction rotation.—Kato Engineering Co., Mankato, Minn.

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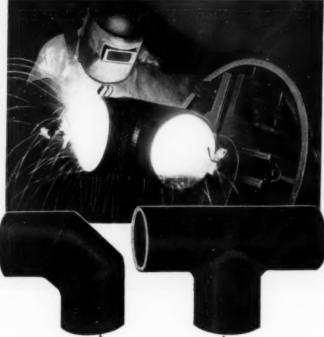
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Double welded on precision jigs. Varied pitch welding bevel cut on automatic machines. Afford greater strength. Save man hours. Supplied with plain, grooved, threaded, or flanged ends-galvanized, cadmium or lacquer finishes.





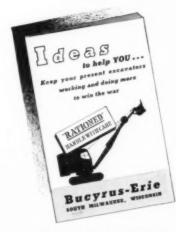
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heck list for big output and low MAINTENANCE



This 32 page, 5½ x 8½" booklet, attractively illustrated and printed in two colors, is packed with practical, experience-tested suggestions on how to maintain maximum excavator production. Ask your Bucyrus-Erie excavator distributor for copies for your organization, or write us direct if you prefer.

Efficient job planning and preventive maintenance essential to continuous peak excavator performance demand constant vigilance. Check your operations against this list to make sure nothing important is being neglected:

- 1. Give your operator a chance to be a good one. Plan your job setup to move materials with the fewest motions in the shortest distance.
- Analyze your cycle time, study delays and the percentage of your job efficiency at regular intervals.
- **43.** Weigh monthly production records rather than daily. Steady output chalks up records that count.
- 4. Keep your excavator clean and inspect thoroughly at regular intervals. Stop troubles before they start, make repairs promptly.
- Watch adjustments daily. Keep them right, always. This speeds output, saves repairs.
- 6. Keep lubricants clean. Dirt and grit build up into a grinding compound, sabotaging machinery.
- 7. Fellow lubricating instructions religiously. Correct lubrication is best prescription for long life and trouble-free operation.
- Drain engine crankcase while hot, flush out periodically. Keep fuel clean. Use clean soft water in radiator, flush regularly, don't put cold water in a hot engine.
- **9.** Observe safety rules. Accidents are losses to everyone concerned. Safety first pays dividends.

Each one of these points is discussed in detail — there are over 100 specific suggestions — in a free booklet we hope will be helpful to your organization. It applies to all makes of excavators.



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NEWS FROM MANUFACTURERS

About Their Products

The publications reviewed below, will keep you posted on latest developments in construction equipment and materials available for your use.

LIGHT-REFLECTING FLOORS-Universal Atlas Cement Co., 135 E. 42nd St., New York, N. Y. (24 pp., illustrated) New type of light-reflecting floor in-stalled in aircraft plants for Boeing, Consolidated, Douglas, North American, and others is described in this booklet "Light from Floors Speeds War Pro-duction." It was prepared in collaboration with various authorities on illumination, design, and construction. Source material cited includes current articles and publications on lighting and comprehensive lighting survey by General Electric of white-cement and gray-cement floors in Consoli-dated's plant at Fort Worth, Texas. Built of concrete made with white portland cement instead of gray or other darker materials, these light-reflecting floors become giant reflectors instead of absorbers of light. According to text, this increase in illumination helps to increase production, reduce accidents, boost morale, and preserve health. Booklet concludes with sections on recommended practice for construction, surface treatment of floors, and maintenance experience in Consolidated installa-tion at Fort Worth which shows that white-cement floors are easy to keep clean, encourage cleanliness, and retain reflection advantage.

PUMP APPLICATIONS—Deming Co., Salem, Ohio. (32 pp., illustrated) Presents pumps being used by

Army, Navy, and industry in this country and abroad. "Use Index" lists many uses to which pumps are now applied, since recent developments have opened new fields for modern pumping equipment. Water and other liquids must be moved in increasing volume, at greater speed, and with higher efficiency to satisfy these requirements. Also indexed by number and type

indexed by number and type of pumps. For each pump are given photographs, uses, general description, and specifications, including pipe size, motor, and capacity in gallons.



HYDRAULIC FREIGHT ELEVATORS—Revolvator Co.. North Bergen, N. J. (4-p. folder, illustrated) Describes elevators designed to move material from one floor to another and from one level to another that is less than floor-to-floor height. Latter machines, known as ramp eliminators, are used to feed metal or paper sheets to presses or carry loads from street level to basement. Illustrates interesting installations of elevators, and describes installation procedure.



LEHIGH PORTLAND CEMENT COMPANY . ALLENTOWN, PA. . CHICAGO, ILL . SPOKANE, WASH.

Get This 3-Way Protection, With "BOSS" Couplings

- 1—Protection from costly job delays due to leaky, inefficient hose connections.
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GROUND JOINT

FEMALE HOSE COUPLING STYLE X-34

Washerless, leakproof construction. Powerful, all-'round grip provided by strong "BOSS" Offset Interlocking Clamp. Corrugated stem; free-swiveling wing unit. Male or female spud. Sizes: 1/2" to 4" inclusive.



"BOSS" WASHER
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Same as above, except that stem and spud are designed to seal with washer, instead of ground joint union. Male or female spud. Sizes 1/4" to 4", inclusive.

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Main Office and Factory: PHILADELPHIA, PA.

AIDING WAR FRODUCTION WITH CLEAN DRY AIR—Logan Engineering Co., 4900 Lawrence Ave., Chicago, Ill. (8-p. bulletin) Shows how Artidific cleans and dries compressed air by centrifugal force. Points out unnecessarily high maintenance and replacement costs and loss in man-hours resulting from moisture and dirt in compressed air lines. Explains how units are placed in line and gives complete specifications for sizes from 36 in. to 10 in. Pictures representative installations, with contaminated air problem that was solved in each case.



ENGINEERING PROGRESS REVIEW—Allis-Chalmers Mfg. Co., Milwaukee, Wis. (64 pp., illustrated)
Reports on year's work, with 212 photographs and drawings of company products. Chapter devoted to each department, including blower and compressor; centrifugal pump; crushing, cement and mining; electrical; engine and condenser; feedwater treating; hydraulic turbine; marine; milling machinery; steam turbine; and tractor.

* * *

FABRICATED PIPING—Flori Pipe Co., St. Louis, Mo. (64 pp., illustrated) Covers various ways in which piping can be used and lists present market prices



for all kinds and sizes of fabricated piping. Describes use of pipe in invasion barges, power plants, tank factories, paper mills, battleships, and filling stations to convey gas, air, steam, oil, and chemicals, or for construction purposes. Company specializes in architectural or structural grades of standard or lightweight pipe, mechanical tubing, and boiler tubing. Also manufactures pipe fittings.

manufactures pipe fittings, valves, flanges, and special plate steel products.

MANUAL FOR CONCRETE AND MORTAR COM-PUTATIONS-North American Cement Corp., New York City. (16-p. booklet) Provides data from which can be quickly determined quantities of materials required for variously designed concrete and mor-tar mixtures. Concrete proportioning data is made available on volumetric basis as well as on basis of weights and measures. Thirteen tables give: (1) Water-cement ratios for various conditions of exposure: (2) water-cement ratios and trial mixes for various types of concrete construction; (3) quantities and estimated compressive strengths trial mixes of various water-cement ratios: (4) auantities and estimated compressive strengths based on cement content per cu. yd.; (5) quantities per cu. yd, of concrete for various volumetric mixes; (6) materials for 100 sq. ft. of concrete of different thicknesses, using trial mixes with various water-cement ratios; (7) quantities for 1 cu. yd. of concrete using sand and pea gravel; (8) quantities for 100 sa. ft. of concrete of different thicknesses using sand and pea gravel; (9) quantities for 1 cu. yd. of mortar; (10) quantities for 100 sq. ft. of mortar, different thicknesses; (11) board feet for various sizes of lumber: (12) cubic feet of mortar and number of masonry units required for various types of construction: and (13) quantities of materials for mortar, using Blue Bond mortar cement with damp sends of different weights per cu. ft.



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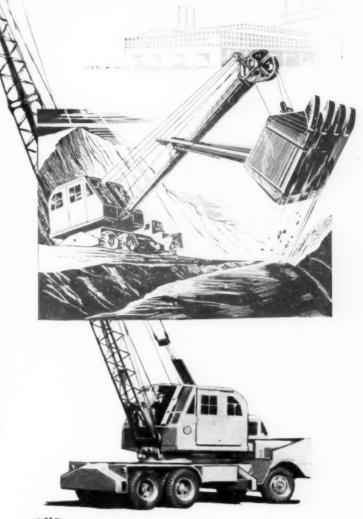
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 $m Y_{OUR}$ share in the re-building of a war-worn world will, in a large measure, be determined by your operating costs . . . Today, on all frontsat home and abroad - the dependability, operating speed and truck mobility of MICHIGAN Mobile CRANES and SHOVELS are playing a big part in the war against the Axis. And from this most exacting of "proving grounds" will come features which will be even more outstanding than those for which MICHIGAN has long been famous - improvements which will help you to keep costs at a minimum to meet post-war competition.

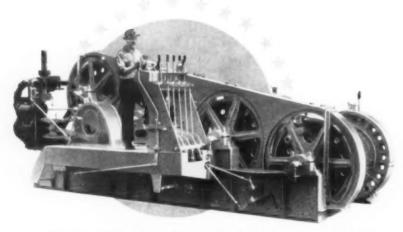
Write for complete specifications given in Bulletin CM-93.





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AMERICAN TERRY DERRICK CO. . . . South Kearny, N. J.

MANUAL-Ransome Machinery Co. Dunellen, N. J. (100 pp., illustrated) Covers operating, maintenance and parts list on 14-S Model U concrete mixers. Also contains helpful information for use by operators in conserving their mixers and to aid them in getting maximum per-termance. Titled Parts List No. 315.



FOREMANSHIP AND ACCIDENT PREVENTION IN INDUSTRY—American Mutual Liability Insurance Co., 142 Berkeley St., Boston, Mass. (94-p., illustrated pocket textbook) Is designed to teach accident prevention to foremen. Aids in training of new men placed in position of foreman and in further schooling of toremen of long experience as to their accident control duties.



QUALIFIED TO SERVE—Stran-Steel Division, Great Lakes Steel Corp., Penobscot Bldg., Detroit, Mich. (20 pp., illustrated) Covers huts and utility build-



ings for military forces featuring Stran-Steel archrib construction. pany supplies complete building package to meet military requirements for tropics or snowbound north. It also supervises production of 30 plants that contribute collateral materials for huts. Stran-

Steel has worked closely with military engineers not only on alternate materials but also to make smallest possible package to save shipping space. Erection of arch-rib hut and utility buildings is speedy, simple job, requiring only screwdrivers, wrenches, and hammers

CRANE TROUBLE SHOOTER-Harnischfeger Corp., Milwaukee, Wis. (32-p., pocket-size manual) Pre-pared for men in charge of servicing overhead traveling cranes, it is arranged in simple question and answer form and indexed for quick reference. Under each question pertaining to certain troubles are listed probable contributing conditions which should be inspected and remedied. Also contains complete lubrication charts, standard crane operating signals, sample inspection report, operating cautions, and a schedule on safe lifting of loads with chain, wire rope, manila rope and sisal rope

MANGANESE STEEL-American Brake Shoe Co., Chicago Heights, Ill. (48 pp., two color) Describes "toughest known steel" and discusses its industrial uses. Subjects covered: Chain, conveyor and elevator; sprocket wheels and buckets; gears; heat treating and carburizing containers; properties of manganese steel; pulverizer parts; industrial ma-terial handling pumps; rail clamps and car replacers; sheaves; welding products for reclamation and hard facing; wheels, and X-ray laboratory. Outlines use of manganese steel for chemical process industries; docks, shipbuilding and maritime applications; foundries; gas and coke plants; glass industry: paper mills; steam power plants, and miscellaneous industries.

Why detergency plus heat-proofing

is needed to keep heavy duty engines clean

• STANOLUBE H. D. is a "heat-proofed" oil. What that means is described by the diagrams on this page. What it means in longer engine life and lower maintenance is written in the records of millions of miles of heavy duty operation rolled up by trucks and buses, contractors' equipment, and the jeeps, trucks, and tanks of Uncle Sam.

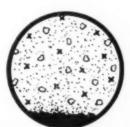
In fact, it is only because of the vital part your civilian fleet plays in the war effort that Stanolube H. D. is made available to you. Take advantage of the opportunity. Let Stanolube H. D. help you solve the biggest problem you have today—that of making your equipment last for the duration.

Ask a Standard Oil Man to help you test Stanolube H. D. See for yourself how persistent deposits in heavy duty gasoline and Diesel engines disappear when Stanolube H. D. takes over. Write to any local Standard Oil Company (Indiana) office, or 910 S. Michigan Ave., Chicago 5, Illinois. In Nebraska, write Standard Oil Company of Nebraska at Omaha 2.

These pictures tell the story

Engine deposits caused by oil contamination

Most troublesome engine deposits are caused by the gradual contamination of motor oil in use. The contaminants usually found in conventional oils are shown in the diagram below.

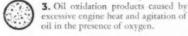




1. Road dust.



2. Fuel soot or carbon that has blown by piston rings.



NOTE: Water is a contaminant frequently found in motor oil. It results from leakage or condensation, and produces water sludge

which takes many forms—from a slimy mass to deposits easily confused with those caused by dirt or oil failure. Water sludge occurs more frequently in cold-running engines, such as in delivery trucks. It can be eliminated, not by changing the type of oil, but only by correcting the mechanical condition causing it.

Dust and carbon particles form heavy deposits in ring grooves and crankcases, and on valve stems, rocker arms, oil screens, and filters.

Oil oxidation products are of many types. Some cause rapid increase in oil viscosity. Others, under certain conditions, cause corrosion. But by far the most prevalent and troublesome oil oxidation product is that causing a varnish or lacquer-like coating on pistons, cylinders, and valve stems. This type of product is not only troublesome itself, but it acts as a binder for dust and carbon particles.



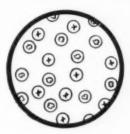
Oil is ammunition . . . Use it wisely

Effect of detergency on contaminants



Detergency in motor oil eliminates deposits by preventing fine dust and carbon particles from settling out of the oil. In effect, the detergent surrounds the contaminants with a film which prevents them from adhering to each other and to metal parts of the engine. It holds them in suspension until they are removed by the filter or drained from the crankcase. But detergency alone does not protect against oil oxidation, which causes varnish forming products, viscosity increase, and corrosion.

Detergency plus heat-proofing or oxidation-inhibiting



To eliminate all troublesome deposits—particularly those occurring under extremely heavy duty service in gasoline and Diesel engines—a new type of motor oil was developed by Standard Oil. First, a petroleum stock was selected with great resistance to oxidation. Then, by solvent refining, the unstable hydrocarbons—those easily oxidized—were removed as completely as possible. Finally, the remainder were stabilized by the addition of a special oxidation-inhibitor and detergent developed in Standard Oil laboratories.

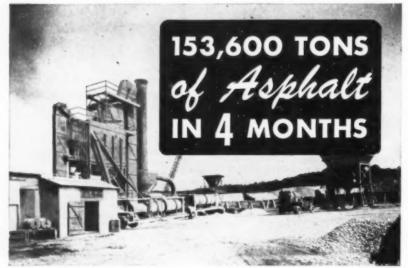
This oil—"heat-proofed" STANOLUBE H.D.—slows down the rate of oil oxidation to the minimum. The detergency becomes doubly effective in preventing deposits from other contaminants. The mild solvency or purging action of Stanolube H. D. gradually removes deposits formed prior to its use and has cleaned up many a dirty engine over a period of time.

STANDARD OIL COMPANY (INDIANA)



* FLEET CONSERVATION SERVICE







-Bad Weather and All - On Ordnance Project

MILWAUKEE, WISCONSIN, U.

World's Largest Builders of Heavy-Duty Air-Cooled Engines

With this Hetherington & Berner plant, the Hunkin-Conkey Construction Co., of Cleveland, produced 153,600 tons of asphalt in four months on the Ravenna ordnance project. The schedule called for 100 tons per hour for a 20 hour day—bad weather and all. This production is typical of the way in which H & B mixing plants are helping speed the building and maintenance of roals that lead to Victory. H & B plants are available today, of course, only for essential military projects. The H & B factory itself is engaged almost 100% on war work, but H & B owners are assured of dependable service on parts and repairs.

HETHERINGTON & BERNER Inc. . INDIANAPOLIS, IND.

METALLIZING APPLICATIONS—Metallizing Co. of America, 1330 W. Congress St., Chicago, Ill. (40 pp., illustrated) New catalog lists metallizing applications, describes metallizing gun and accessories, and gives information on following subjects: (1) Equipment maintenance and repair in various industries; (2) technique of metallizing; (3) bonding sprayed metals to prehardened surfaces by means of electric bonder; and (4) use of auxiliary init to simplify and improve arc welding.

ELECTRONIC LEVEL CONTROLS—Photoswitch. Inc., 77 Broadway, Cambridge 42, Mass. (4-p. catalog section) Diagrammatically describes series of rugged electronic relays for level control of liquids and powders. Types are available to provide single level indication and control, on and off pump control at two levels, boiler feedwater control, and trunk condensate signals.

STEEL TANKERS

(Continued from page 68)

building combination, was until recently project manager for the big program of dry-dock construction of the dredged basin type completed for the Navy by Drydock Associates, comprising Spencer, White & Prentis, Inc., Foley Bros., Inc., and Merritt-Chapman & Scott Corp.

Thus the shipbuilding industry, which has already enlisted the services of construction organizations like those of Kaiser, Bechtel, Dravo, Barrett & Hilp and others, has again turned to the construction industry in an emergency as the best source of new shipbuilding talent to expand its own personnel and facilities. The Turner organization has had a long and successful experience in the construction of large industrial and commercial building and more recently participated in the building of a dozen or more naval air bases in the Pacific; since it started in business the Turner company has completed about \$700,000,000 worth of construction. Spencer, White & Prentis, Inc., are best known as underpinning and foundation specialists, with experience also in lock and dam construction, subways and drydocks; work done by this organization totals about \$350,000,-000, including recent construction for the Army in Irak and Iran.

A feature of the tanker program which has been undertaken by the two Eastern construction firms in collaboration with the Gulf Coast shipbuilding company will be the extensive use of pre-assembly methods to produce at high speeds large, welded units forming integral parts of the new steel vessels.



Because of its scientifically designed bowl and correctly pitched cutting blade, the Heil Cable Scoop digs bigger payloads faster . . . But this isn't the "one big feature" of Heil Cable Scrapers. It is merely one of many. Heil engineering also gives you all-welded construction—fulcrum-type lift—scientifically located draft-pivot point—ample tire clearance—an all-around design that assures you of faster, more efficient performance in the toughest situations you ever run into... If you want bigger "bonus loads," easier maintenance and simpler field repairs, longer life, a name for meeting hurry-up schedules—here is the equipment for you . . . Write for bulletins illustrating these Heil features.

CORRECT BOWL DESIGN

The size and shape of the bowl and front gate make for good boiling action. The back sheet of the bowl proper slopes forward at the top.



. . CONFORMS WITH NATURAL BOILING ACTION

The dirt has a tendency to boil into a mound-like load. The Heil bowl fits the load — without extra digging time and spillage due to forcing dirt into empty pockets at the rear.





Must NOT Fail!

GMC olive drab Army Trucks by the thousands are helping the Allies to out-transport the Axis on many battle fronts. As important as these military vehicles are, they are no more vital to victory than commercial vehicles on the home front. It is the loyal duty of every truck owner to give his equipment the best service so that it can give our country its best service. General Motors Truck Dealer Service organizations . . . headquarters for the original P.M. Service, and experts in truck-saving service for all makes . . . are devoting all their efforts and facilities to keeping your trucks on the job for the duration.

Special "Service Payment Plan" available through our own YMAC



GMC TRUCKS

GASOLINE . DIESEL

WORN SHAFTS REBUILT

(Continued from page 70)

cu. yd. when operated as agitators. A shaft weighs about 300 lb. and costs about \$60. Because of the critical shortage of alloy steels, new shafts are difficult to obtain.

Bearings at the two ends of a mixer shaft are located on the outside of the mixing chamber. Each bearing is protected from the contents of the mixing chamber by packing contained in two packing rings on the inside of the hopper. Fine particles of sand and cement penetrating between the shaft and the packing cause a polishing and eroding action which eventually reduces the shaft diameter by 1/16 to ½ in. for a distance of 4 in. Average life of a shaft is 3 to 4 years.

Shaft Replacement

Worn shafts formerly were replaced with new shafts. Replacement of a shaft required removal of the entire mixing chamber and driving mechanism from the chassis of the truck. After the bearings had been removed, a 48-in, dia.



GROUND TO SIZE, built-up portion of mixer shaft presents restored packing surface with wear-resistant qualities capable of giving long service.

gear was pressed off the old shaft and pressed on the new shaft. The entire mechanism was then reassembled and installed on the truck chassis. Much time is saved by eliminating these laborious operations and rebuilding the worn portions with sprayed metal while the shaft remains in place in the mixing chamber.

Preparation for Metallizing

To prepare worn packing surfaces for rebuilding with sprayed metal, the edges

(Continued on page 112)

LINK-BELT SPEEDERS CLEAR THE WAY FOR MORE FARM ACREAGE

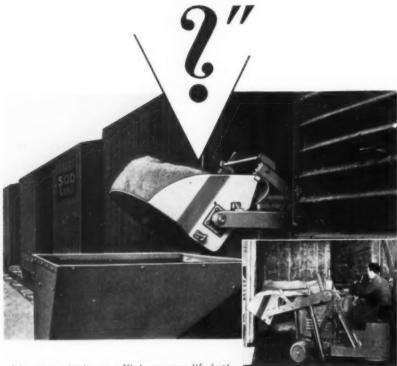


• Fertile Minnesota farms will grow more and bigger crops because Link-Belt Speeder draglines—from Minneapolis, west—are ditching the marshy land to drain off excess water. It takes the toughest job in its stride! This is just one more example of the way contractors are using Link-Belt Speeders to accomplish today's big jobs—efficiently and on time! There is a Link-Belt Speeder for every size and type of job—22 different models of crawler and truck mounted shovels, draglines and cranes are available.

"STAY ON THE JOB — absence makes the war last longer"



"MAY I STICK MY NOSE INTO YOUR BUSINESS



It's not curiosity or officiousness, it's just the Butler Carscoop hard at work—

sticking its steel nose into boxcars, stockpiles, crowded corners anywhere, and carrying away a load of material with amazing speed.

Take bulk cement, for example. A Carscoop with an average operator can unload a 300 barrel boxcar in an hour and a quarter. Vitally needed men are freed for other construction work, and cement handling is speeded tremendously.

The machine isn't limited to cement, either. Dried clay and brass billets, foundry sand and lead concentrates, all come within its range of operations. Wherever bulk material is to be handled rapidly and efficiently in confined quarters, call on the Carscoop—it specializes in jobs that "can't be done".

BUTLER BIN WAUKESHA WISCONSIN

(Continued from page 110)

of the worn portions first are undercut with a pneumatic hand grinder while the shaft is rotated through the power takeoff. The purpose of this operation is to create a definite shoulder at each end of the undersize portion and thereby eliminate feather-edging of the deposited coating.

After the worn portion has been properly ground to produce definite shoulders, the surface is prepared by the Fuse-Bond process, which applies a thin, rough layer of special metal by means of an electrical unit developed for the purpose by Metallizing Engineering Co., Inc. The special metal, fused to the shaft, forms the most efficient bond yet found for sprayed metal.

Immediately after the fuse-bonding operation, the surface is built up by metallizing with sprayed metal to about 1/16 in. above the finished dimension. The wire used for metal spraying is Metcoloy No. 2, an extremely hard and wearresistant high-chrome, high-carbon alloy steel. This material has given outstanding service in operation on packing surfaces and, in addition, approaches the analysis of the metal in the shaft.

Finishing Metallized Repair

Final grinding to size is accomplished with a pneumatic grinder of hand type clamped in a holding device which can be moved horizontally along two rods, parallel with the shaft, and adjusted vertically by a slotted arrangement of the bolts securing the holding device to the base plate traveling on the rods. An accompanying drawing indicates the design of the apparatus.

To the underside of the base plate are welded four 1-in.dia. steel bushings bored to 49/64 in. Through each pair of these bushings passes a 3/4-in.-dia. rod of the same length as the inside length of the mixing hopper of the concrete mixer. The two rods, with the base plate attached, are welded to the ends of the hopper with the rods exactly parallel to the shaft. The base plate and the attached grinder can be slid along the two rods by hand.

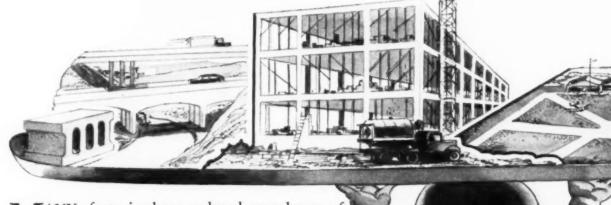
By placing the wheel of the grinder somewhat above the center line of the shaft, as indicated on the drawing, it can be adjusted downward toward the center of the shaft to regulate the depth of cut on each pass of the grinding wheel. Careful grinding with a medium No. 36 grit silicon carbide wheel results in a surprisingly accurate finish and an extremely long-wearing packing surface.

Time Saving

Exclusive of the time required to fabricate the grinding fixture, it is possible by metallizing the shaft in place to return the truck to service in one day.

HIGH EARLY STRENGTH

WITH CALCIUM CHLORIDE FOR ALL CONCRETING



MANY factories have reduced man hours of labor required to produce planes, ships and guns — sometimes 50% or more.

In war-urgent concreting it's "waiting hours" instead of "man hours" that hold up completion of concrete work. These waiting hours are reduced one-half to three-fourths by incorporation of calcium chloride in portland cement concrete mixes to produce higher early strengths.

Forms may be removed in half the time and succeeding courses placed earlier. Finishing may follow placing promptly to maintain work schedules — and the concrete containing calcium chloride has greater strength at all ages.

These advantages are confirmed in the findings of many years of tests at The National Bureau of Standards. Write us for Bulletin 28—"Early Strength Concrete."

CALCIUM CHLORIDE ASSOCIATION
4145 Penobscot Building Detroit 26, Michigan



CALCIUM CHLORIDE

SPEEDS YEAR-ROUND CONCRETE CONSTRUCTION



. . . are the choice of those who want JACKSON standards of quality, dependability and performance. No other flexible shaft vibrator can offer such assurance.

Supplied with a 2%" and a 1%" head. These two heads give user a vibrator efficient in and suitable for a wide range of applications. For instance, from wall sections of comparatively large size to narrow sections.

Model FS-6A, illustrated above, is furnished complete with 7, 14, 21 or 28 feet of shaft. Has dirt-proof turntable base. Supplied with or without wheelbarrow mounting.



ELECTRIC TAMPER & EQUIPMENT CO.

IMPORTANT TO SELLER and BUYER



M A P M A K I N G

(Continued from page 78)

graphs about 2 in. on a 9x9-in. negative. The central lens of the three points vertically downward, the ones to the right and left obliquely downward, so that the horizon appears near the upper edge of the photographs. Flying down a planned course, an Army plane can photograph 20,000 sq. mi. in 3 hr. Once the pictures are made, they are rushed to Washington for translation into navigation maps for the air forces, as well as for ground forces in lieu of maps with greater detail.

The actual mapping job is done by a staff of 250 technical personnel in the Geological Survey, half of whom are young women specially trained for the task. One mile on the ground is represented by approximately 1/16 in. on the map. Upon receipt of a shipment of pho-



AERIAL PHOTOGRAPH is adjusted in Sketchmaster. Instrument creates image of picture on map so selected details can be transferred.

tographs, flight lines are first plotted on the best available maps. All available geodetic control points are plotted on the index map. Then come tilt analyses of the oblique photographs; use of the rectoblique plotter, an instrument that will determine the true horizontal angle to each of the selected photographic points on that oblique; the determining of the azimuth and relative orientation of the successive photographs of a flight, and

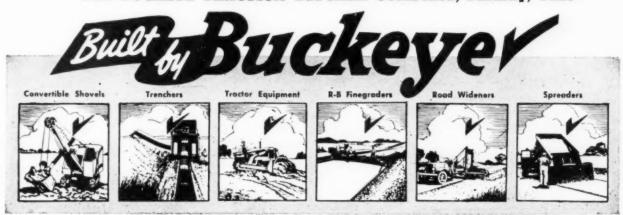
(Continued on page 116)



CONTROL is the keynote of Buckeye spreading. Signed reports from users consistently tell of accuracies as high as 99% on both thickness of spread and consumption of materials. Labor savings of 50% and material savings of 20% and more are commonly reported.

Act now to secure these benefits. The new BUCKEYE SPREADER BULLETIN explains the power driven feed roll that grips the material and lays it down as smoothly as unrolling a rug; also gives complete design and construction data, specifications, etc. Write for a copy today.

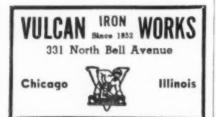
THE BUCKEYE TRACTION DITCHER COMPANY, Findlay, Ohio





Twice the blows per minute means more piles per dollar. Simple design — positive action — less steam used—ease of operation—less cost to operate—durability. Add up all these points and you have the answer for fast, sure, low-cost pile driving with Super-Vulcan Open Type, Differential - Acting Pile Hammers.

Write and get all the facts.



(Continued from page 114)

the making of paper and metal templates, thereby obtaining a mechanical triangulation position for each of the tie points on the obliques. After all points are located on the map sheet they are permanently marked with celluloid ink.

Planimetric detail is transferred from the vertical and oblique photographs to the map sheet by means of the Sketchmaster, a camera lucida type of instrument which creates a virtual image of the photograph on the map from which the delineated detail can be traced directly. By raising and tilting the instrument the observed image can be brought to the proper scale and corrected tilt. The image is brought into position by sliding and adjusting the Sketchmaster so that the circled pass points on the photograph image fit directly over the corresponding points on the acetate map sheet. After the instrument is thus properly adjusted the delineated detail is traced from the photograph to the map sheet in pencil.

There follows checking, editing, the addition of all known names to the map, and the adjustment of adjoining older map data. The completed compilation is then reduced photographically to the desired scale and carefully traced on cellulose acetate sheets for color reproduction. Mapping is under the direction of William Embry Wrather. Geological Survey director.

ACCIDENTS

(Continued from page 55)

their work and left the machine. There was no indication that maintenance men were provided with warning tags or other devices to place on starting apparatus to prevent unexpected starting.

Signals and instructions were often confused. When several employees were working together, one was not specifically designated to give all signals. Verbal instructions were not repeated. Both legs of a repairman were fractured due to a combination of these causes. He went under a machine to make an inspection; the operator was given incorrect instructions by an unauthorized worker, backed up, and ran over the repairman. The extremely dangerous practice of going un-

(Continued on page 118)



.. WHEN THE PAYOFF COMES

"Sick-Absenteeism" takes its toll!

Common colds and other nuisance illnesses can take a terrific toll . . . days away from work, jobs suffering from further cuts in man-power. Payday produces half-filled or empty time cards. Today, when every minute counts, extra precaution should be vigilantly exercised to protect the men at their vital work on construction projects. Stop a cold before it spreads!

Keep Your Men on the Job!

One of the most flagrant offenders in spreading colds and other contagion is the old-fashioned water bucket. It has no place in the work you are doing to win the war. Common sense dictates the modern, safe way to water your men. Give them the protection of a Dixie Portable Water Tank. . . . It takes a drink to the men, where they are working, in individual paper cups. Equip your modern water boy with Dixie or Vortex Cups and keep your men on the job.

If you are not using this easy, quick and healthful method to water your men, write to the Dixie Cup Company for picture folder and complete details, Offices in Easton, Pa., Chicago, Ill., Toronto, Can.





DIXIE CUPS

ONE OF THE VITAL HEALTH DEFENSES OF AMERICA-AT-WAR

CEMENT SCORES IN ARMY TESTS!...

see below

stronger now than when installed.

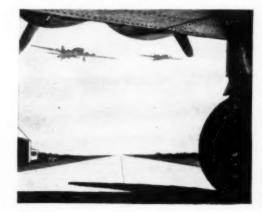
TREAT ISLAND, MAINE... A remarkable improvement in the frost-resistance and toughness of cement can be achieved by adding small amounts of Hercules Vinsol* Resin, army tests demonstrate.

Conducted by the Corps of Engineers, U. S. Army, the tests were started three years ago with 273 test beams of various types of concrete, installed on Treat Island, Maine. During the winter months, the best beams were subjected to alternate freezing by Maine winds and thawing by salty flood tides. Although all of the normal-cement concretes deteriorated rapidly under this gruelling treatment, the Vinsol-treated cements not only remained intact, but are actually stronger today than when originally installed.

FOR RUNWAYS, HIGHWAYS...Vinsol-treated cement has been found exceptionally effective for runways and highways—both for improved frost resistance and for successful checking of scaling caused by chloride salts in modern icecleaning methods. Technical information on Vinsol, and requirements for all vital construction, are available from Hercules. Write in, today.



0.05% VINSOL, MAXIMUM... Although only 0.05% of low-cost Vinsol was used in the army tests, as little as 0.025% of Vinsol is being used in many cases. Introduced during the clinker-grinding operation, the Vinsol improves not only frost and scaling resistance, but also plasticity and workability of the cement mixes.









DUAL

CONSTRUCTION MACHINERY CO. WATERLOO, IOWA

Save money with accurate construction estimates

You know how much in profits it would mean to you to have more accurate estimates with less discrepancy between esti-

mated and actual costs—how much in business gained by closer bidding. Now, this book helps you achieve these results. It will pay out further in time saved, by helping you to get accurate estimates more quickly and easily.

H. E. PULVER'S

Construction Estimates and Costs 653 pp., 6 x 9, many diagrams and tables, \$5.00

Takes up each step of construction work sensrately-from first investigation to final, detailed estimates-and provides simple, arithmetical methods of accurately estimating costs. Covers esti-mating with both tables and diagrams and includes specimen tables and diagrams. Both diagrams and tables show variations in quantities as well as in prices of material and labor. Worked-out estimates for typical jobs show application of methods.

EXAMINE IT 10 DAYS - MAIL COUPON

+ 10	
	McGRAW-HILL BOOK CO., INC., 330 W. 42nd St., New York 18, N. Y.
	Send me Pulver's Construction Estimates and Costs for 10 days' examination on approval. In 10 days I will send \$5.00, plus few cents postage, or return book postpaid. (Postage paid on cash orders.)
8 8	Name
	Address
	City and State
	Position
	CompanyC.M 9-43

(Continued from page 116)

der equipment and in other dangerous places without notifying the operator, or taking other precautions, was the cause of several deaths. An oiler attempted to grease the track of a crane between swings and was crushed.

Reports frequently ascribed accidents to failure to station signalmen at congested or dangerous locations. Six men were killed in an accident at a railroad crossing which did not have this protection. Other bad accidents involving operators' restricted vision could have been prevented by signalmen. These men, however, should be carefully selected and instructed because they also were occasionally injured.

(2) Slipping and falling in getting on and off standing or moving equipment resulted in one-eighth of all injuries. They varied in severity from strains to deaths. The worst accidents happened in getting on and off moving tractors, bulldozers, and railroad cars. Serious injuries were sufficiently numerous to justify the strict rule that only designated employees be permitted to ride on mobile equipment. Unauthorized riding on railroad cars frequently resulted in a fatality and strenuous efforts should be made to stop the practice.

Most injuries, however, happened in getting on and off stationary equipment. Jumping off was one of the worst practices. One man who jumped from a standing railroad car sprained both ankles. Another worker failed to use the ladder, fell and fractured his spine. While muddy shoes and surfaces caused some bad strains and sprains in getting on and off standing tractors, most of the injuries occurred in good weather. Feet slipped on rough and frozen ground, rocks, and even pebbles in getting on equipment. In shifting position to get off, the smooth and uneven surfaces of the tracks caused

(3) Inadequate maintenance caused 10 percent of the accidents, according to reports, but it is likely that the proportion is larger. More cranking accidents, for example, involved backfires that were specifically ascribed to defects in timing and starting mechanisms. The parts which especially require close inspection and better maintenance are brakes, cables, timing and starting.

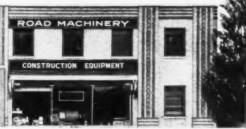
The worst injuries were due to defective brakes and worn cables, and in many cases they resulted in costly delays and property damage. In one bad accident due to faulty brakes, a worker was struck by a load and sustained a head concussion, broken ribs, chest injuries, and a broken leg. Other parts which were involved in accidents and which should not be overlooked in making inspections,

(Continued on page 120)



STERLING HOISTS on the job mean steady production without delay! African





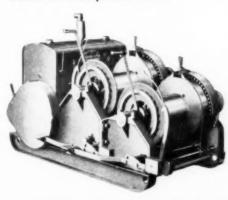
Wm. H. Ziegler Co., Inc., Minneapolis

Consult Your STERLING DISTRIBUTOR

When a man like Mr. J. S. Gilman, Vice-Pres. and Secretary of the Wm. H. Ziegler Company, Inc., states that Sterling Hoists on the job mean steady production without delay ... that's worthy of consideration by every hoist user. Take the tip... Sterling Hoists on YOUR job will increase production.

There's no doubt about it...your Sterling Distributor is a man to know. You'll find his complete staff of maintenance men, engineers, parts specialists, machinists and field men ready to serve you on a moment's notice.

Make it a policy to call YOUR Sterling Distributor when problems arise.



Contractors everywhere have found they can do more work at less cost with Sterling Hoists because Sterling's fully developed and thoroughly tried and proven design assures dependable performance. Write for complete Hoist Catalog today.



Wm. H. Ziegler Co., Inc., Duluth



Wm. H. Ziegler Co., Crookston

Sterling Pumps, Hoists and Light Plants are rugged in construction, simple in operation and dependable in performance. Write for complete literature on these outstanding products.

Allied Member A. E. D.

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MACHINERY CORPORATION
405-13 SOUTHWEST BLVD.
KANSAS CITY 10, MISSOURI

KEEP CONSTRUCTION HORSEPOWER ON FULL TIME WITH AMALIE MOTOR OIL

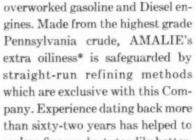


Preventing breakdowns before they happen is an important part of keeping vital bulldozers, scrapers and power shovels in full time operation. And an important part of preventive maintenance is the regular use of AMALIE Pennsylvania Motor Oil.

Because of its Greater Oiliness* AMALIE is doing a time-andmoney-saving job for thousands of make a fine product steadily better.

Write Dept. C163 for your FREE copy of our manual-"Lubrication Data on Contractors' Equipment"approved by equipment makers.

*The Sperry-Cammen Adheroscope test ranks straight-run Pennsylvania Oils highest in oiliness.





AMALIE DIVISION

L. SONNEBORN SONS, INC., 88 LEXINGTON AVE., NEW YORK 16, N. Y. Refineries: Petrolia, Pa., and Franklin, Pa. western Distributors Sonneborn Brothers, Dallas, Texas

(Continued from page 118) were clutches, clamps, hooks and similar devices.

(4) Training workers to keep in the clear in walking or working near moving tractors, cranes, and similar equipment is necessary for eliminating the fourth of the major causes of heavy equipment accidents. Injuries due to failure to keep in the clear were far more numerous in hooking and releasing loads than in doing other jobs. Men failed to step back a sufficient distance while loads were raised and to stay back until they were lowered.

A typical accident happened in handling a lift of steel. The craneman was lowering a load and before it came to rest, a worker took hold of the sling and the steel landed on his legs and feet. The employee also took a chance on having his hand or fingers crushed because loose. suspended loads sometimes shift. If a hook or board is not available for holding a sling in place in hitching loads, placing the flat of the hand against the sling is safest.

A number of serious accidents prove that the extra effort to get in the clear in working on elevations or in close quarters near swinging loads, buckets, and booms is worth the trouble. One accident resulted in a fractured spine. A tank was swung into position over its support on which a worker was standing, knocking him to the ground. It was somewhat inconvenient for him to get into the clear and both he and the craneman took a

A narrow opening between a revolving platform of a dragline, shovel, or crane and a heavy pile of steel, railroad car, or bank was another hazardous location which trapped and killed workers who tried to squeeze through it. They took a short cut instead of walking around the machine the other way. Other injured men had ample working room around moving tractors, trenching machines and similar equipment but failed to keep clear. A switchman attempted to cross tracks just ahead of moving cars and was struck and killed. A laborer was shoveling dirt too close behind a trenching machine when his shovel caught in the bucket line and jerked him into the ma-

Employees did not recognize the dangers from loose railroad ties, planks, and other heavy materials in the paths of moving equipment. When such materials were struck on the ends by the wheels of moving equipment, they flew and hit nearby workers. One man stood a few feet from a tie, which was struck by a tractor and was hit in the stomach, sustaining an abdominal injury.

Workers should also be taught to keep away after hitching or hooking chains and cables on to logs, stumps, and ma-

(Continued on page 122)



60 PAGES OF RELIABLE INFORMATION IN HANDY POCKET SIZE!

Just off the press, this Guide is chock-full of facts on how to properly lubricate and maintain your vital mechanized equipment. It has been especially prepared by Gulf Lubrication Service Engineers with the sincere hope that it will prove helpful to you and your organization. It is easy to read and authentic in every detail. To get your copy of this useful book, just fill in the attached coupon.



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Troweling off-CONCRETE PIERS





matter of hours -instead of days

From footings to sills is a matter of 48 hours where Sonotube Concrete Pier Forms are used. The Laminated fibre tubing comes in six standard sizes... INCIDE DIAMETER

8"	9"	10"	11%"	12"	13%"
		SQUARE	INCHE	S	
50.26	64	78.54	100	113.1	144

After sawing to lengths-(pier heights) and braced or backfilled it is ready for pouring. Can be stripped off or allowed to slough off.

IMMEDIATE DELIVERY

Widely used and U.S. Army Engineers
Approved for Cantonments and Value Department Yards and Docks otherGovernment P. B. A. and F. H. A. WRITE FOR DELIVERED PRICES

SONOCO PRODUCTS COMPANY

(Continued from page 120)

chines. When loads are pulled, cables sometimes slip, hooks pull out, or logs catch and swing, and nearby workers are struck. A laborer was badly injured and a tractor damaged in one of many accidents which occurred in this way. The man walked too close to a log towed by a tractor. The log was also hitched too close to the machine, caught against a rock and flew into the air. One end hit the machine and the other end hit a

(5) Unsafe practices in cranking motors ranked fifth in the list of causes of general construction equipment accidents. Cranking is the largest single source of injuries in the operation of tractors. Accidents were due to failure to retard the spark, grip the handle with the thumb along the forefinger, stand correctly, and other unsafe procedures. One-half of the injured workers sustained fractured wrists and arms

(6) Working on or near moving parts of machinery is one of the principal unsafe practices causing permanent disabilities in most industries. Injuries were exceptionally numerous in operating concrete mixers. Most of the remaining accidents occurred in oiling and repairing draglines, power shovels, and cranes. The average lost time per injury was large-241 days, excluding fatalities.

The most hazardous moving parts were cables. Riggers, oilers, operators, and repairmen were caught while freeing, adjusting, and repairing cables near sheaves and pulleys. The men took hold of the cables just ahead of the sheaves and their hands were jerked into them. In some cases the drums were turning too fast and the guiding was done with the hands instead of a bar. Slipping, partly due to insecure footing, sometimes preceded such accidents. In other accidents involving slipping, the feet were caught between revolving drums and frames. Gloves and loose clothing contributed to a number of cases. One-third of all accidents in working on moving parts involved cables, pulleys, and sheaves.

The other outstanding source was moving gears on cranes, shovels, and draglines. Oilers were frequently injured because they attempted to grease up without stopping the machinery. Several emplovees were crushed to death in trying to apply grease to tracks between swings of dragline platforms. Gloves, loose clothing, and rags were also factors. The use of extension oil cups and other safe types of lubricating devices was not mentioned in the reports as a means of preventing these accidents.

Other serious injuries occurred in cleaning conveyors, oiling and cleaning around motor fans, and cleaning and

(Continued on page 124)



Until the last Jap is cleaned up

THE BYERS SHOVEL OR CRANE YOU'D LIKE TO BUY NOW IS HELPING TO CLEAN THEM UP.

In the meantime, owners of current and older models of Byers shovels and cranes may depend on Byers Parts Service to help them keep present equipment working steadily and satisfactorily.



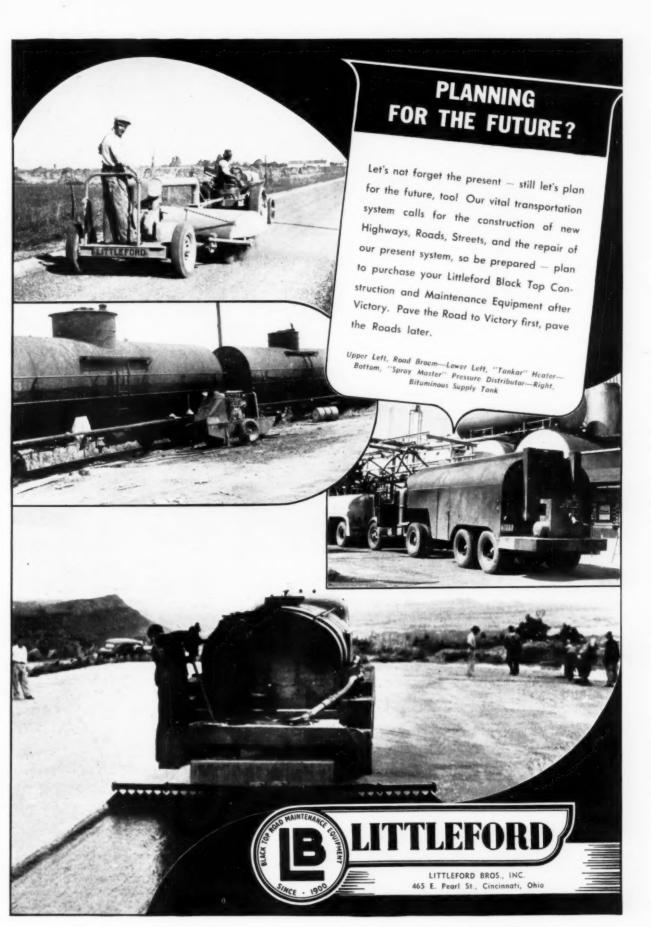


DROP FORGED WRENCHES
All ARMSTRONG Construction and Structural
Wrenches are drop forged from special
analysis tool steel, and heat treated. Openings
are accurately machined, handles are long
and tapered for ease in lining up bolt holes.
"Construction" Wrenches in Chrome-Vanadium or Carbon Steel—with 15, 45° or 90° angle heads
with openings of from 7°16° to 2°.
"Structural" Wrenches with straight heads and off-set
handles, in Chrome-Vanadium or Carbon Steel in the sizes
listed above.

"Box Socket Structural Wrenches, in Chrome-Van with double hexagonal (12 point) openings from 1½ for 2½.

(Recommended wherever an open end wrench is not required because of these safety convenience features, Write for Catalog





Your Terms · · Unconditional Defiance



THE ENSIGN-BICKFORD COMPANY, SIMSBURY, CONNECTICUT

A pound of REPAIR * * * is worth a ton of REPLACEMENT

Equipment kept in repair has double WAR Value

- It stays longer on the job, keeps out of the repair Want advice?
- Constant repairs postpone equipment replacements and conserve valuable war materials.

That's the whole story in a few words. Surely no hardheaded and patriotic equipment user needs to be SOLD on the argent need for "doing the most with what we have." If you're using Reliance Products and repairs DO become necessary, you'll find their rugged simplicity a big asset in such work. There's nothing complicated or hard-to-fix about Reliance Equipment. The same construction that makes them stand up on the job makes them easier to fix. Don't wait for breakdowns. Go over your equipment NOW and you'll be well repaid for your time and trouble.

write RELIANCE

If you're using Reliance products, tell us which ones and we'll be glad to advise you how to stop trouble before it starts. This service creates no obliga-tion on your part. Write us

RELIANCE PRODUCTS

Statiance offers a complete line of Rock Crushers; Bucket Elevaof Neck Crushers; Bucker Ervaters; Revulving Screens; Storage Bins; Pulverizers; Chip Sprand-ors; Heating Kettles: Bin Gates; Feedaws; Belt Conveyers; Grizziios; Air Separators; Sand and Gravel Spreaders; Wash Baxes.

UNIVERSAL ROAD MACHINERY CO. Kingston, N. Y., U.S. A.

DISTRIBUTORS IN ALL PRINCIPAL CITIES OF U.S.A.

(Continued from page 122) working around the skips and blades of mixers without first stopping them.

- (7) Inadequate guarding caused 6 percent of the injuries and was seventh in importance among the causes of general equipment accidents. Most of the injuries were due to unguarded gears on power shovels, mixers, and cranes. Other unguarded parts of machinery were motor fans, platforms on crushers and mixers. sprockets and chains, and belts and pulleys. Some bad injuries were due to the failure of mechanics to replace guards and inspection plates after repairs.
- (8) While injuries due to unsafe handling of materials and machine parts were generally less serious than those resulting from other unsafe operating practices, they were a substantial proportion of the total. Hernias and other bad strains, as well as leg and foot injuries, incapacitated workers for considerable periods.

Failure to take a firm hold in lifting. carrying, and placing machine parts caused one out of two handling accidents. The injured men were usually engaged in making repairs, adjustments or changes in equipment. In doing these jobs, the parts slipped and fell on their feet or struck their legs or toes. Safety shoes were not worn.

Strains occurred under various circumstances. A few employees overestimated their ability to carry heavy objects over rough ground and did not obtain help. Others attempted to lift heavy parts while standing in an awkward position. Operators also sustained strains and hernias in pulling levers while standing in awkward positions. Some levers, however, were difficult to operate and others were in inconvenient locations. The principal unsafe practice, however, was lifting with the back instead of the

(9) Injuries due to lack of, or failure to use, personal protective equipment were. of course, the eye, toe and hand accidents. These comprised 4 percent of all injuries involving general construction equipment. The most serious were fractured toes, which could have been prevented by wearing safety shoes.

Eye injuries were twice as numerous as toe and hand cases. Tractor operators lost time from injuries due to dust particles. Other slight eye injuries, however. occurred under potentially dangerous circumstances. A repairman got a sliver in his eye in driving a piece of iron with a hammer, and a laborer was splashed by hot tar. No reports indicated that goggles were provided in spite of the fact that they were required for such work. The use of proper gloves would have prevented many of the injuries to hands in handling materials, such as cement, cables

(Continued on page 126)

PERFORMANCE IS THE YARDSTICK

OMED

Wherever or for what purpose wire rope is used, the objective is trustworthy performance. A premature failure slows down the work, consumes more material and increases the operating cost.

To meet the unprecedented demands of today, we recommend Preformed "HER-CULES" (Red-Strand) Wire Rope. Due to the advantages of the preforming process, it is easier, quicker and safer to handle . . . the normal "breaking-in" period is shortened . . . it lasts longer. These statements become verified facts when measured by the yardstick of performance.

WHAT HAVE YOU DONE TODAY FOR VICTORY?

A. LESCHEN & SONS ROPE CO.

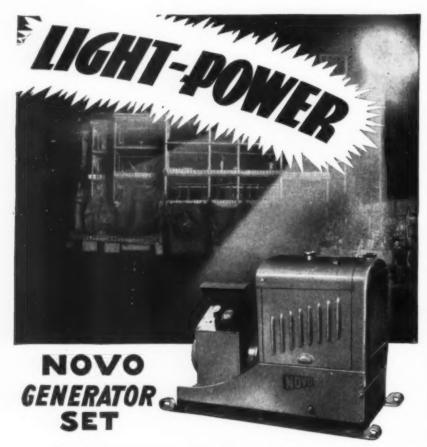
5909 KENNERLY AVENUE

NEW YORK ' ' 90 West Street
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DENVER ' ' 1554 Wazee Street



STABLISHED 1857

SAN FRANCISCO ' 520 Fourth Street
PORTLAND ' 914 N. W. 14th Avenue
SEATTLE ' 3410 First Avenue South



On planes, tanks and ships it's "Fire Power"—for fast construction it's "Light-Power" that brings your vital jobs through ahead of schedule.

The Novo Generator Sets or "Light Plants" are powered with heavy duty industrial type engines—simple and fool-proof in construction—no extra gadgets, non-automatic, economical in original cost and operation.

Engines are equipped with efficient governors that hold voltage practically constant. All Novo Engines are antifriction bearing equipped and have extra large fuel tanks and large oil capacities for long periods of operation.

Unfailing LIGHT for night work and POWER for small electric tools. Send for complete information.

FREE INSTALLATION DATA

We have for your use, Installation Data Sheet No. 2002 which gives useful information on the operation and installation of generator sets, how to figure loads and selection of wire, different current characteristics, etc.

FACTORY OVERHAUL OF ENGINE

A factory overhaul for your Novo Engine regardless of the equipment on which it is mounted, Pump, Hoist, Mixer, Light Plant, etc., will make the heart of that equipment practically new and these jobs carry a new guarantee—See your Novo Distributor or

write us for full information.

NO	VO	ENG	INE CO	MPANY,
200	Porte	er St.,	Lansing	, Michigan

Name

Address...

(Continued from page 124)

and lumber. This is particularly true for operators working levers who developed blisters which became infected and forced them to lose time.

(10) The use of blocking would have prevented a substantial number of accidents in making repairs and in operating cranes and draglines. A number of very costly accidents happened because operators failed to set outriggers before handling materials on slopes and soft ground. A highly skilled worker was seriously injured, a job delayed, and a crane badly damaged in one accident because this precaution was not taken. Rollers, railroad cars, and other equipment were stopped on inclines without blocking, and before the work was completed, they rolled forward or backward and injured one or more men.

Most accidents occurred in changing or repairing equipment. Heavy parts, such as pans, scrapers, buckets, and gates, were not supported, fell, and caused strains, lacerated hands, and fractured fingers and feet.

(11) The number and severity of accidents in driving tractors and similar machines over rocky or soft ground warrant more control over operations under these conditions. Operators struck holes in fields and roads and were thrown from the machines, sustaining fractured ribs and painful bruises. Strains also were incurred by attempting to control a bucking steering wheel when operating equipment under these conditions. Reports ascribed the accidents to driving too fast for conditions, not watching ahead, and having hands on the spokes instead of in the proper position on the rim of the steering wheel. Some night accidents were due to inadequate illumination.

(12) Most injuries due to placing hands and fingers in pinch points occurred in attaching hooks to buckets. After a laborer on one job had two fingers crushed in this way, grasping the hook at the top was made standard practice. Other injuries were due to haste—signaling moves before the hooks were properly placed. Fingers also were caught in guiding buckets or other loads through narrow openings.

In loading and unloading box cars, fingers were frequently caught between the door and the jamb in closing the door. A number of workers placed one hand on the edge of the door and the other on the handle, and a hard pull drove the fingers on the edge of the door against the jamb. One man had part of a thumb amputated in this way.

(13) The outstanding feature of accidents at dangerous locations, such as the edges of high fills and near power lines,

(Continued on page 128)

ALBI-FIREPEL "S" - the modern scientific fire retardant coating material...Protects against the intense sustained fire.

VEDNESDAY, AUGUST 4,

NATION'S FIRE LOSSES

NATION'S FIRE LOSSES

RUN \$1,000,000 A DAY

Total for First Half of Year Is

BOSTON. Aug. 3 (U.P.) — Fire losses in the United States averaged more than \$1,000,000 a day for the first half of this year, Robert S. Moulton, chairman of the National Fire Protection Association on fire record,

National Fire Protection
tion's committee on fire record,
announced today.
The preliminary estimate, he
said. was based on the \$190,514,000
total losses reported to the Natorial losses reported.

The preliminary standard to the Natorial losses reported to the Natorial losses reported.

"Help Guard the Home Front Against Fire" FIRE PREVENTION WEEK OCTOBER 3.9, 1943

ALB firepel "S"

MATERIAL LISTED AND APPROVED BY

MINDERWRITERS Department of the services of t

for complete information write to

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9 Park Place

New York 7, N. Y.



Do you know your regular SKILSAW will do grooving in a single operation? Just replace the regular blade with this GROOVING BLADE (illustrated at left) and you're ready at once to groove for stairs, shelves, and weather stripping . . . to slot floors for sliding doors . . . to speed up rabbeting,

speeds all grooving, rabbeting, mortising,

mortising and many other jobs.

It's wise right now to learn about all the different jobs you can do with SKILSAW. That's how you'll learn to cut costs on more operations... to save more time... to get yourself bigger, more profitable contracts in the days to come. Ask



(Continued from page 126)

is their high severity and costly property damage, and the long delays which result. Injuries from contacting power lines were often fatal. It is specifically required that draglines and similar equipment must be operated at least 10 ft. from power lines.

The greatest number of accidents occurred at the edges of fills and the worst ones were overturnings. The operators were sometimes caught and crushed under the machines. In one instance involving a tractor operator, the slope of the fill was too steep and no signalman was provided to direct the operators.

Equipment sometimes got stuck on slopes of hills and was unable to pull out up hill. This set the stage for an accident. Instead of getting another machine to pull him out, the operator attempted to drive down the hill and overturned. Other factors in overturning were driving into deep holes and dumping big rocks which dropped under the wheels. The power shovel operator on one job disregarded instructions not to load large rocks. Narrow and poorly constructed ramps were the principal causes of bad accidents in unloading and loading mobile equipment.

(14) Unsafe practices in fueling motors and checking the water in radiators often caused painful burns, in addition to the injuries which were incurred in cleaning and oiling near moving, unguarded fans. They were caused by: Using gasoline for washing parts; fueling with the motor hot or running; lighting a match to look into a gasoline tank, and removing the caps from boiling radiators.

(15) Accidents due to leaving equipment in gear, not setting brakes, and otherwise failing to secure machines and their parts before making repairs or moves and doing other work were relatively infrequent but they were severe. Some were fatal. A shovel operator went to lunch and left the swing gear engaged, and when he returned and started the machine, the bucket swung into a group of men. Several were seriously injured. Another operator stopped a motor roller in reverse gear and when he started, it backed over a worker's feet.

The ordinary precaution of setting brakes after stopping equipment on grades was also overlooked. Railroad cars rolled away and caused accidents for this reason. Brakes must be set securely. This was sometimes omitted in making changes and repairs, and the result was an accident, In one instance an oiler was killed because the operator of a backhoe did not pull the brakes tightly and the bucket dropped on the oiler. A laborer was killed under somewhat similar circumstances. He was struck by a swinging

(Continued on page 130)



THE FIGHT AGAINST Mud and Muck ALSO IS BEING WON!

A NEWS STORY describing the landing of American troops on a Pacific island says, "The soil is a soupy barnyard muck. The soup begins on the beach, goes inland over hills, valleys, ridges and mountains. Through it, supplies, food, ammunition, blankets are taken by 'Caterpillar' Tractors and Trailers."

The hauling of supplies and equipment through the toughest kind of footing is a job for sure-footed Athey Forged-Trak Trailers. Laying their own rails of steel, they serve as a rugged, cross-country railroad, transporting heavy loads through regions where no roads nor trails exist.

That's why they've been highly successful in the Victory march of the Allied Nations. On every battle front, Athey Forged-Trak Trailers are furnishing the dependable transportation for vital war supplies that mechanized warfare demands. Whether it's in the tangled undergrowth of the tropical jungles or on the tundras of the Arctic, makes no difference to all-weather Athey Trailers. They're "bringing in the goods" to isolated places where other means of transportation would be helpless.

The entire Athey-"Caterpillar" dealer organization has enlisted its forces to keep present machines in good operating condition. If you wish information on the delivery of Athey equipment, or specialized repair service, be sure to see your Athey-"Caterpillar" dealer.

Athey Truss Wheel Co., Chicago, Ill.



SURE TRANSPORTATION



The "Fist-Grip" Clip Has 3 Strikes on Hitler

Saves accidents — can't be put on wrong; doesn't weaken rope; greater holding power.

Saves metals -25% fewer clips do the job better; no crushed rope ends; flush nuts — no battered threads.

Save time — fewer clips to put on; nuts on opposite sides tighten easier, faster with any type wrench.



"Finger-Pinch". U-bolt clips unavoidably crimp, distort and bow wire rope, causing reverse strains when load is applied.



"Fist-Grip". Fewer Safety Clips hold rope straight in smooth, vise-like grip, with no protruding threads to get battered in use. Clips and rope can always be used on the next job.

Distributed Through Mill Supply Houses Look for Laughlin Products in Thomas Register





(Continued from page 128)

boom which the operator had neglected to secure properly before the equipment was loaded for moving.

(16) Injuries due to poor housekeeping occurred on machines ond on the ground. Mud, oil, loose boards, and tools caused slips and falls on machines. On the ground and roadways loose ties, boards, logs, and wire were tripping hazards. Such materials may also be dangerous in other ways. A foreman was caught by a piece of wire which was tangled in the track of a bulldozer and his foot was pulled under the track and crushed. Loose and heavy boards may also be struck by moving equipment and hurled against workers.

(17) Accidents due to overloading equipment were infrequent but like other infrequent causes, they resulted in serious injuries, delays, and property damage. The worst accidents resulted from overloading draglines and cranes. The booms collapsed and struck workers. Inexperienced operators failed to realize the possibilities of overturning in handling heavy loads with the machine set on soft or sloping ground. In one such accident, an oiler was bruised and a crane badly damaged. Reports stated that power shovels were overloaded in at least two ways. The first was filling dippers too full, causing rocks to fall and strike workers in swinging the dipper. A fractured skull was sustained in this way. The second was taking too large a bite and at the same time using too much power. The machines pitched and threw operators and oilers against frames and other parts of the machine.

Conclusion

It is obvious that far greater attention must be given to the elimination of the causes of accidents resulting in serious injuries, heavy property damage, and long lay-ups of equipment. While marked improvement was effected in the 1942 injury frequency rate, this was accompanied by a much smaller decrease in the severity rate as compared with 1941. There was little improvement in the frequency and severity of serious accidents.

The principal source of serious accidents involves the operation of draglines, tractors, and other general construction equipment. Motor timing must be more carefully checked and brakes, cables, and clutches must be more frequently and thoroughly inspected and kept in first-class condition. Supervisors must devote more time to directing equipment operations and be more positive and effective in the instructions they give to workers in safe practices, and the enforcement of such practices must be more strict.



Fumping under all conditions

Contractors standardizing on Gorman-Rupp Pumps are getting extra hours instead of costly shut-downs due to pump failures. There's a DEFINITE REA-SON. More dependable. No priming jet to clog. No control valve to jam. This is important today when every piece of equipment has to take a beating. Let your distributor show you why more contractors are switching to Gorman-Rupp's every day.

Distributors in more than 100 principal cities.

THE GORMAN-RUPP CO., MANSFIELD, OHIO

GORMAN-RUPP Self-Priming Centrifugal Pumps



DOORS, SASH, SCREEN
FITTED 3 TO 5 TIMES FASTER
with the J-5 ELECTRIC PLANE

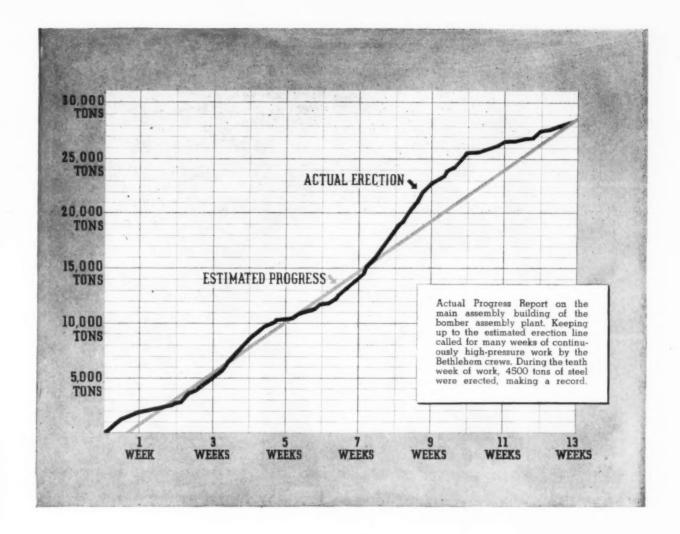
There's no time to lose on construction jobs these days. Uncle Sam wants to save all the man-hours possible, and this J-5 Electric Plane helps save a lot.

With its 1 H.P., 18,000 R.P.M. motor, the J-5 is the most powerful electric plane on the market. It will "hog it off", "ig" at a stroke, or plane a paper thin shaving to a satin smooth finish. Easy to handle-weighs only 16 pounds.

Set up with a bench bracket, it can be used as a joiner for inside trim and similar work

Write for the Carter catalog. It describes the J-5 Plane and other popular Carter Time-saving Tools. R. L. Carter Division, The Stanley Works, 140 Elm Street, New Britain, Connecticut.

CARTER SAVING TOOLS



4500 tons of steel erected in a week

Bethlehem's erection crews have set another record in putting up the steelwork for one of the largest war plants in the nation, a bomber assembly plant covering 47 acres, somewhere in the Southeast.

The job called for fabricating and erecting the steelwork for five separate buildings. The largest structure, the main assembly building, is 1020 ft. wide by 2000 ft. long. The 28,119 tons of steel that went into this building were put up in 81 working days, or 2082 tons per 6-day week. In one week 4500 tons of steelwork were placed.

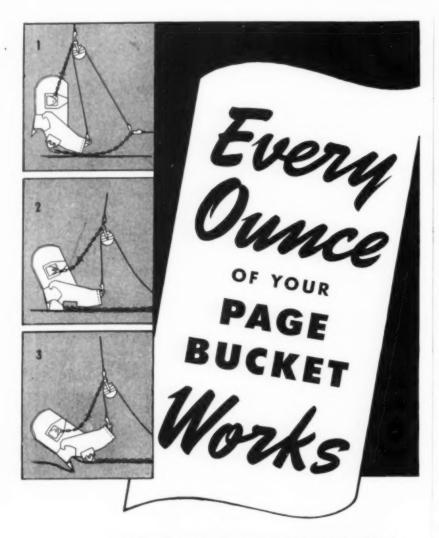
The week-by-week story of the work on this main

assembly building is told on the progress report above. Note how closely and consistently the line of actual erection follows

the line of estimated progress. And how the Bethlehem crews, after getting their second wind, got way ahead of estimated progress during the latter half of the job.

This huge bomber assembly plant is one of a large number of key war production plants fabricated and erected by Bethlehem. All of them have been constructed under full throttle. For a bomber, a tank, or a ship today may well be worth ten tomorrow.





A Page Automatic Dragline Bucket HAS

to dig... and dig deep... because it is so designed that it always lands on its forward arch, rocks back into digging position instantly, with ALL its weight on the TEETH. The proper use of TOTAL WEIGHT makes a Page Bucket (1) land right, (2) bite right in, and (3) load fast and full. Every ounce of a Page Bucket works!



PAGE ENGINEERING COMPANY . CHICAGO, ILLINOIS

ROOFERS TECHNIQUE

(Continued from page 72)

move swiftly under pressure. Even pipes and fittings, such as Ts, Ys and elbows of diameters ranging from 16 in. down, had to be lined. In one 4-in. pipe, protection had to be provided against the attack of acid passing through at the rate of 180 gal. per min. The lining material selected to give this acid-resisting protection is chiefly a synthetic product called Tygon, made in 2½x5-ft. sheets by the U. S. Stonewear Co., Akron, O.

Kay Nielsen got all the information he could from the manufacturer's instruction sheets. He had a factory representative on the job as long as technical advice was needed and from then on he developed his methods and equipment as fast as experience showed ways and means

to improvement. An effective aid in checking results is a testing unit developed on the job by the McNeil electrical department, which makes use of a potential of 18,000 v. on a brush-like conductor which can be swept lightly over a surface on which the protective coating has been applied. Slightest imperfections in the protective lining are indicated not only by an electric discharge but by illumination of a neon tube mounted in the apparatus. The volume of the discharge and the brilliancy of the neon glow indicate the relative size of the defect in the coating. The most minute opening in the lining can thus be detected and can be chalkmarked for repair by heat treatment with an electric iron. In this way, by immediate tests of a finished surface, defects are quickly located and methods of preventing their recurrence can be studied.

Roofers Trained for Job

Men previously skilled only as roofers thus were trained to be "potters," a similar but far more specialized branch of the construction industry. By concentrating on the fine points of this art, so effectively did Nielsen train his crews that a factory representative of the firm making the special lining made a written report that "after one week of experience on this job, construction crews advanced to a stage where they were equal to potters with 5 years' experience."

How Lining is Applied

Typical of the methods used in applying adhesives and making tight joints in the acidproof lining are the following: The Tygon sheets are cut to the required (Continued on page 134)



... but not Your Payroll!



His company's 77 years of lubrication experience backs him. The lubricants he recommends have been tested and retested!



He can call in lubrication engineers to help with "problem" equipment if necessary. Engine oil analyses expert help with maintenance schedules and other valuable

services are available.

The Socony-Vacuum Man!

HE HELPS YOU SAVE TIME

on War-Rushed Jobs!

The equipment you're working with is getting older every day—yet you still can't afford delays.

That's why we're sure that the Socony-Vacuum Man can help you.

He's not a "know-it-all" with a stock solution for everything—but an experienced lubrication man, a "helper" more than a salesman.

He puts Socony-Vacuum's 77 years of experience—the greatest in the lubrication business—to work solving your problems. He brings you lubricants which increase the relia-

bility of your machines. He can give you expert help with maintenance schedules and many other important services which Socony-Vacuum's resources make possible.

Talk with the Socony-Vacuum Man soon. He can make your maintenance job easier—help you keep work on schedule.

SOCONY-VACUUM OIL COM-PANY, INC., and Affiliates: Magnolia Petroleum Company, General Petroleum Corporation of Calif.



SOCONY-VACUUM FUELS, LUBRICANTS AND ENGINEERING SERVICE

The Moretrench Wellpoint System for Predraining Wet Excavation



FAST-ECONOMICAL-GUARANTEED

MORETRENCH CORPORATION

90 WEST STREET, NEW YORK, N.Y.

CHICAGO, ILL.

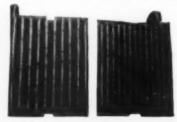
ROCKAWAY, N. J.

NEW ORLEANS, LA.

Crushes 4900 Tons

where formerly 1800 tons had been the limit!

WHEN your crusher jaws become seriously worn, don't think of throwing them on the scrap pile. Instead, save yourself the trouble of a costly replacement and an annoying shut-down by doing what one company does,—and that is to hard-face worn crusher jaws with wear-resistant Coast Metals. Here 4,900 tons of material are now



being crushed, whereas formerly, with uncoated standard manganese jaws, 1,800 tons had been the limit.

Coast Metals Hard-Facing is of particular value wherever it is difficult or impossible to get new parts, or replace those which are worn out because of the heavier load and longer periods of service to which equipment today may be subjected.

Easily applied by arc or acetylene welding to surfaces, edges, points of new or old equipment of any ferrous metal. Let us tell you how Coast Metals Hard-Facing can meet your particular needs.

COAST METALS, INC.

Plant and General Offices: Canton, Ohio Executive Offices: New York, N.Y.

COAST METALS
hard-facing
weld rods

(Continued from page 132)

size and shape. Then, after six coats of preparatory fluid have been applied both to the metallic surface to be covered and to the sheet of lining material, the sheet is laid in place carefully and accurately and then is pressed down firmly.

The drying time required for the successive coatings and for the development of adhesive effect after the lining and metal are pressed together, makes it advisable to have two or more pieces of work simultaneously under way. In that way the crew can be moved from one to another, as successive steps are completed, avoiding lost time while the applications dry and set.

Perhaps even more important than the contact surfaces between lining and metal are the joints between edges of abutting sheets of the lining. These joints require very special care. For linings 3/32 in. thick, Nielsen found that the best method (see sketch herewith) is to scarf one of the abutting edges and to lap over it the other edge, with no pre-treatment other than a clean, square cut. This over-lapping portion is firmly cemented to the scarfed surface and then the projecting lip is smoothed down with a hot electric iron, leaving a slightly thickened section in this portion of the lining. Finally, the critical line of this joint, that is, the line of contact along the inner surface of the two adjoining sheets, is reinforced by a narrow strip of the same material melted down, with the aid of an electric iron, in a groove cut along the contact line for the purpose. This strip, usually 1/2 in. wide by 3/32 in. thick, constitutes a heat-sealed stop at the entrance to the cemented joint between the two sheets, thus arresting at the start the tendency to progressive failure that would result when acid action crept into the cemented joint.

Lining Large Diameter Pipe

When pipes 12 to 16 in. in diameter have to be lined they are cut into a maximum length of 4 ft. and the lining is applied with a minimum of joints, using the typical overlap process where joints have to be made. In pipe specials made of cast iron it was found that the metallic surface had too many minute cavities or pits to permit the desired tight fit between metal and lining. Experiment and experience soon developed a technique which began with first sandblasting the inside of these specials, then filling the cavities with a metal cement, after which a carborundum wheel was used to grind the surface smooth. After this pretreatment six coatings were applied as on other metal surfaces.

By these methods and expedients the

(Continued on page 136)



You can replace your worn-out pajamas in 10 minutes...



... but it may take <u>weeks</u> to replace a set of bad piston rings

The answer is
Preventive Maintenance
now with Shell
Diesel Lubricants





IN TODAY'S high-speed Diesels, temperatures in the piston-ring area range from 350° to 500° F. With a temperature variation such as this not only the lubricating oil itself must be good, but the lubricating system must be checked thoroughly and often.

For under these severe temperature conditions, the use of "just any oil" or an insufficient amount of even the best oil, will cause piston rings to stick. Then hot gases blow-by the pistons, temperatures rise . . . rings are ruined.

And because piston rings are not easy to get in a hurry these days you've got a tied-up piece of equipment... something no operator wants. That's why it's extremely important that more than the "normal" amount of care be taken to assure the proper lubrication of your engines. This will mean more frequent check-ups . . . more attention paid to the

quality of the lubricant used. But those few extra minutes will be well spent when compared to the costly delays they can help you avoid.

Don't wait for a break-down. Call in the Shell man now. Let him help you plan your Preventive Maintenance.



First oil refinery to win Army-Navy "E"— Shell's Wood River Refiner

SHELL DIESEL LUBRICANTS
AND SHELL "DIESELINE"





RANSOME MACHINERY COMPANY
Subsidiary of the WORTHINGTON PUMP AND MACHINERY CORPORATION
DUNELLEN
NEW JERSEY

(Continued from page 134) cost of applying acidproof lining to the inner faces of electrochemical equipment was reduced by fully one-half. The original Tygon sheet order was for 142,-390 sq. ft. This material costs about \$1.40 per sheet (12½ sq. ft.) and the cost of fitting and fastening it to the intricate surfaces to be lined on this job cost, on an average, more than the material. It was

average, more than the material. It was found that small scrap pieces (measuring 4 in. or less) could be shipped back to the manufacturer and there recalendered into usable form at 64 percent of the cost for new material. Pieces larger than 4-in. scrap are carefully saved for gaskets.

While Tygon is the principal product for acid-resisting linings, several other special linings are used, among them Bitumastic, Celotex, cork and Pyroflex. New methods developed for the installation of Pyroflex enable a crew of seven men to complete in 2 days' operations what formerly required 5 days. This discovery is credited with a saving of \$20.000 in the wash towers alone.

SHASTA DAM

(Continued from page 71)

control gate installation, the river was shuttled between Rows 40 and 44 of the tall concrete blocks forming the dam, each time emerging at the downstream face at a higher elevation as concrete was added to alternate low rows. This process continued until the reservoir created by the dam rose to the level of the diversion tunnel which will handle the entire flow of the river for the remainder of the construction period.

A 900-ft. section of the right abutment of the dam was complete to roadway and sidewalk level early this summer. Concrete placement is progressing on the left abutment where most of the blocks require only a 5- or 10-ft. lift to bring them also to roadway level. The bulk of the concrete remaining to be placed is in the spillway section.

On completion, Shasta Dam will have 18 8½-ft. pipes through the spillway as part of the control works. Four of the conduits are in place and the installation of eight additional ones is in progress. Further regulation of water released for navigation and flood control, irrigation, power production, and other uses is provided by the spillway itself and by releases into the river through the Shasta power plant.



► NEVER AGAIN will the wartime user of construction equipment, who has had firsthand contact with the varied services rendered by the Equipment Distributor in these days of priorities and shortages of machines and parts, take for granted the importance and value of those services.

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STYRENE PLANT

(Continued from page 65)

plant now is being pushed to completion for early operation.

Dredging to raise the ground level of the site was begun in February, 1942. Foundation construction got under way on March 17, 1942, and the first tank car of styrene left Texas City March 10, 1943.

Original plans for the plant were drastically revised several times. Starting off before Pearl Harbor as a relatively small operation, the goal was progressively lifted until capacity now is sixteen times that originally proposed. Before the first working drawings were started, production capacity was set at 3,000 tons per year. Progressive changes in rapid succession increased plant capacity to 6,400 tons, 10,000 tons, 20,000 tons (January, 1942), 40,000 tons (April). and 50,000 tons (September, 1942).

Direction

Operating head of the completed plant for the Monsanto Chemical Co. is H. K. Eckert, plant manager. Construction operations are directed for the operating company by Ralph W. Booker, construction manager for all Monsanto plants, and Robert I. Hayes, project manager. R. W. Smith, construction manager, Esslinger-Misch Co., is in charge of the prime subcontractor's work. The supervising engineer for Defense Plant Corp. is K. H. Sieke, acting under the general direction of F. L. Boydston, division engineer, Houston, Tex., and R. E. Burton. division engineer at the head of the synthetic rubber division, Washington, D. C.

COPOLYMER PLANT

(Continued from page 65)

has been followed with almost no variation in building all the copolymer units. In only one major feature is any marked variation to be found. Most of the plants employ a recovery unit of the type illustrated by accompanying photographs, but a few omit this feature or employ a different type.

In making buna-S, or GR-S, butadiene (Continued on page 140)

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the successful supervisor of civil service employees must have an understanding of supervisory techniques that are all but unicown to the supervisor in private enterprise," says the author of this book. "In these pages, the methods of supervision suggested are those recnumended by a majority of the supervisors who discussed them, all of whom have had years of successful experience in this type of work."



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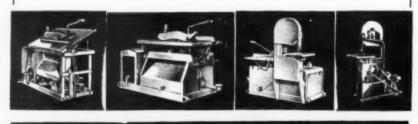
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MANUFACTURING COMPANY

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(Continued from page 138)

and styrene are combined in a ratio, by weight, of roughly 3 to 1. These feed stocks are called monomers. Copolymerization results in monomer conversion of 70 to 80 percent. The copolymerization process in which they combine is known as emulsification-polymerization. Recovery units are employed to recapture the unconverted feed stocks.

Conserving Critical Materials

Photographs show how reinforced concrete and wood replaced steel in structures. Heavy equipment at the plant rests on reinforced-concrete frames and foundation mats; foundation designs were made with a view to using the least feasible quantity of steel bars. Process buildings were constructed with reinforced-concrete columns, brick closure walls and timber roof framing supporting a decking of gypsum plank. Lighter structures such as pedestrian catwalks and bents supporting overhead process lines were built entirely of wood; even the downspouts are of this material. Office buildings are wood-frame structures with asbestos-cement shingles for siding and roofing. The reactor section is partially inclosed by roofing and siding of corrugated asbestos-cement sheets. This material was extensively used for siding and roofing at all of the synthetic rubber plants described by these articles.

In a plant which ordinarily would have required 600 tons of structural steel, only 70 tons was used. As a result of savings in structural steel, the total weight of metal for the copolymer plant was reduced to about 2,000 tons. This quantity includes three 30-ton recovery towers and supplemental vessels and piping for a recovery section.

Other quantities involved in the construction of the plant were as follows: concrete, 14,000 cu. yd.; brick, 2,500,000; Transite siding and roofing, 52,000 sq. ft.; Gypsteel roof plank, 150,000 sq. ft.; pipe of all kinds, about 55 mi. Like other synthetic rubber plants described in these notes for the Louisiana area, the copolymer unit employs cast-iron pipe for high-pressure fire lines and Transite pipe for service water lines.

Making Buna-S

A general idea of the process of making buna-S rubber in a copolymer plant is conveyed by the accompanying photographs. Little more than a general description can be given of the process, which is fairly well standardized for all similar plants.

Styrene and butadiene, the two materials which combine to make buna-S, are received and stored in a tank farm, from which they are pumped to the reactor

(Continued on page 142)



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(Continued from page 140)

area and metered into the reactors. All other ingredients used in the process come through a pigment preparation building and are metered or weighed into the reactors. Rubber is made in the reactors, where copolymerization of the styrene and butadiene takes place.

At the copolymer plant here described, unreacted butadiene and styrene are recovered from the product of the reactors by distillation in a recovery area and are returned to the reactors. Latex, very linely divided rubber, is pumped to a rubber processing building and is there coagulated. The coagulated rubber is collected and washed in a top-feed filter.

From the filter, a broad belt conveyor elevates the material and drops it into a shredder and mill which tears the rubber blanket (produced by pressing in the filter) into small pieces to facilitate drying. The shredded rubber is raised and dropped on the top belt of a three-pass steam-heated dryer. At the discharge end of the dryer, the dry rubber is elevated to a scale which automatically weighs and drops successive equal portions into the cavity of a hydraulic baler. By means of hydraulic rams, this machine presses rubber into bales and discharges them in succession on to a roller conveyor, from which the bales are picked up and packed into cartons for shipment.

Plant Capacities

Copolymer plants in general are constructed with capacities of 30,000, 60,000, 90,000 or 120,000 long tons per year. A standard copolymer unit has a capacity of 30,000 long tons per year, made up of two 15,000-ton lines. The larger plants comprise two to four such units.

Progress

Construction of the plant started in November 1942, and a test run to make the first synthetic rubber was carried out in the plant less than 5 months later. Regular production followed the test run by 15 days.

Construction contractors worked 10and 12-hr. shifts, generally one shift a day, although some crafts operated two shifts. Operations ordinarily were on a 6-day-week basis but proceeded on a 7day-week schedule during the period of greatest activity. Maximum construction employment was 4,100 men. At their peaks, the H. K. Ferguson Co. employed 3,400, and the Blaw-Knox Co., 1,000. The average payroll of the two contractors was about 2,000.

Concrete

Of the 14,000 cu. yd. of concrete required for construction of the plant, about half, during the first part of the job, was

(Continued on page 144)

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(Continued from page 142)

hauled into the site by truck mixers from an outside commercial plant. During the second half of the contruction period, a job mixing plant supplied concrete for distribution by bathtub-type trucks on the 23-acre site. A good portion of the concrete went into reinforced-concrete footings resting on good clay bearing material supporting a designed loading of 4,000 lb. per sq. ft.

Water

Water for plant operation is obtained from two artesian wells with a capacity of 1,000 gpm. each. The first water taken from these wells, 2,400 ft. deep, had a temperature of 95 deg. F., which later went down to 91 deg. For most of the water used in the plant, a temperature of 80 deg. is needed, and for some of it the temperature must be 68 deg. Water from the wells is cooled satisfactorily on towers of California redwood equipped with induced-draft fans.

A utility pump house containing pumps of 3,500-gpm. capacity also incloses compressors and a refrigerating unit required for processing.

Management

As already noted, uniform plans for all copolymer plants were made by a Standard Plant Engineering Committee made up of engineers from Firestone. Goodrich, Goodyear and U. S., collaborating with the engineering department of the Blaw-Knox Co. Modifications in the standard plans are made for individual plants only after submission to and approval by this committee. For the plant now being operated by the Copolymer Corp., the Firestone Tire & Rubber Coacted as architect-engineer-manager for the Defense Plant Corp. during construction and the initial stages of operation.

Operations under this arrangement were directed for the Defense Plant Corp. by R. E. Burton, division engineer in charge of the synthetic rubber division. Washington, D. C., and L. J. McHugh. division engineer for Louisiana at Baton Rouge. Work at the site was managed for the Firestone Tire & Rubber Co. by K. K. Wyatt, construction manager, with W. A. S. Harmon as project engineer.

For the two contractors who built the plant under contract with the Firestone Tire & Rubber Co., Guy Panero was project manager in general charge and J. H. LaDuke was construction superintendent, H. K. Ferguson Co., Cleveland. while A. M. Ives acted as construction superintendent, Blaw-Knox Construction Co., Pittsburgh.

On the basis of reported cost estimates for the copolymer plant here described, the investment amounts to about \$250 per long ton of annual production.

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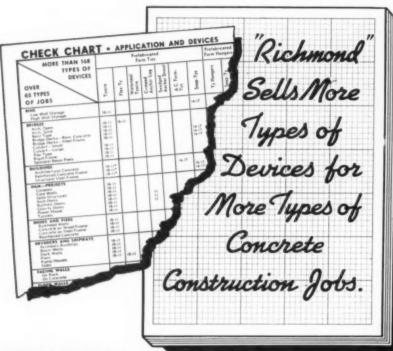
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AIRPORT RUNWAYS

(Continued from page 75)

deflections as measured by pressure cells embedded in the base and indicated graphically on the instruments in the truck for (1) static loads and (2) moving loads. The instrument truck was equipped with developing apparatus and each film was immediately developed and examined so as to be sure of having a satisfactory record for each test point before the equipment moved on to the next point.

These tests were made at a western airport on which construction of the runways had already begun with plantmixed, cement-treated base containing 10 percent, by weight, of cement. As a result of the tests the cement content was reduced to 5 percent for the remainder of the work. In other words, the tests showed that for the conditions obtaining on this job the desired results could be obtained with only half the cement used at the outset. The resultant saving is expected to be effective on other jobs where similar conditions obtain.

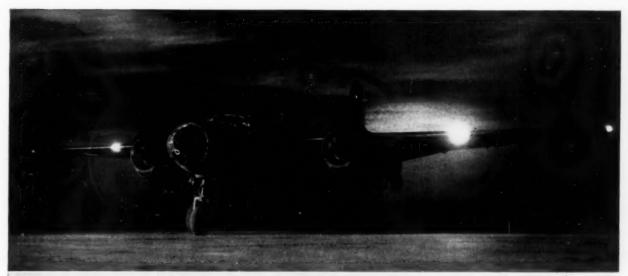
On this job special endeavor was made to see that the base did not contain laminations nor have an uneven surface. These conditions on previous jobs had been ascribed to the lapse of so much time between the addition of water and final completion, that initial set had taken place.

How Difficulties Were Overcome

These difficulties are reported to have been materially reduced or entirely eliminated on this job by: (1) preparing a smooth subgrade; (2) mechanical mixing of base materials; (3) spreading to a uniform thickness; (4) early rolling to final grade; (5) keeping down to 45 min. the time elapsing between mixing and finishing.

The resultant base was smooth and cores taken from it showed no laminations. Part of the success in this respect is ascribed to the "V-snow-plow" ahead of the bulldozer which assured uniform compaction throughout the width of the strip.

So long as the test sections were available, and after the series of measurements had been completed, observations of behavior under long continued traffic were undertaken. It was decided to make a total of 7,000 trips over the elliptical route with trucks and heavily loaded carryalls. However, the long-continued loadings are expected to be generally confirmatory of the more intensive measurements of deflection made for individual loads.



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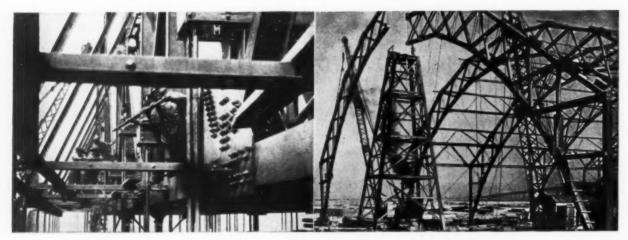
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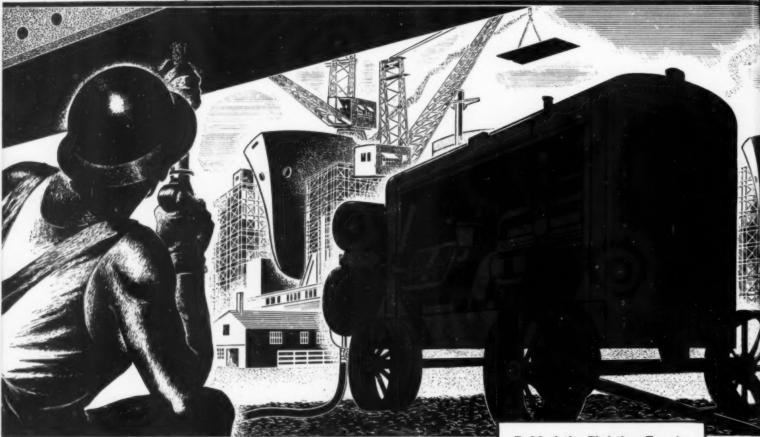
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